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# Journal of Dental Hygiene

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## STATEMENT OF PURPOSE

The *Journal of Dental Hygiene* is the refereed, scientific publication of the American Dental Hygienists' Association. It promotes the publication of original research related to the profession, the education, and the practice of dental hygiene. The Journal supports the development and dissemination of a dental hygiene body of knowledge through scientific inquiry in basic, applied and clinical research.

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# EDITORIAL

## Celebrating Research, Our Future and Dental Hygienists!

Rebecca S. Wilder, RDH, BS, MS



This issue of the Journal of Dental Hygiene is celebrating some of the most talented dental hygienists we have who are contributing to our science! It is with great pleasure that I have the opportunity to highlight their accomplishments in this special print issue. As we look to the future it will be important to have our profession led by committed dental hygienists who recognize the importance of research and publishing.

The ADHA/Sigma Phi Alpha Journalism Award competition has been in existence for several years. The competition is made possible through a grant from Johnson and Johnson Healthcare Products, Division of McNEIL PPC, Inc. We now have two categories for the award at the Master of Science/Doctoral level and at the Baccalaureate level. It is a very competitive process and can be quite challenging if the paper is the first one the student has ever submitted for publication. We are pleased to be publishing the two winning manuscripts from the 2015 competition. The schools that produced the winning manuscripts are the University of North Carolina at Chapel Hill (undergraduate winner) and the University of Missouri-Kansas City (graduate winner).

We are also pleased to share the winner of the 3<sup>rd</sup> Annual Journal of Dental Hygiene Best Paper Award. This year, an independent panel of judges reviewed all original research project papers that were published in the Journal

of Dental Hygiene from January to December 2015. They had specific criteria to utilize to judge the manuscripts and were tasked with selecting the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> place winners. Although the papers have already been published in our digital journal, we are pleased to present the 1<sup>st</sup> and 2<sup>nd</sup> place manuscripts in full and the abstract of the 3<sup>rd</sup> place winner in this print supplement. The schools represented are the Forsyth School of Dental Hygiene at MCPHS University (first place), the Pacific University (runner-up), and the University of Missouri-Kansas City (third place). Congratulations to the authors of these important papers!

Finally, none of these papers would have been possible without outstanding mentoring from dental hygiene and dental faculty members who assisted, encouraged, edited and helped guide these students and authors through the writing process. We know it is not easy to mentor a novice writer but it is so worth it in the end! These students are our future leaders, scholars, educators and innovators. Mentors... thank you! And thank you J&J for helping us showcase our winning manuscripts!

Enjoy CLL and Pittsburgh!

Sincerely,

Rebecca Wilder, RDH, BS, MS  
Editor-in-Chief, Journal of Dental Hygiene



# ADHA/SIGMA PHI ALPHA JOURNALISM AWARD: MASTERS/DOCTORAL

## Cultural Competency in Dental Hygiene Curricula

Danette R. Ocegueda, RDH, MS; Christopher J. Van Ness, PhD; Carrie L. Hanson, RDH, MS, EdD; Lorie A. Holt, RDH, MS

This project won 1st place in the ADHA/Sigma Phi Alpha Journalism Award Competition, May 2015, under the masters/doctoral category. Award provided by a generous grant from Johnson & Johnson Healthcare Products, Division of McNEIL PPC, Inc.

### Abstract

**Purpose:** The purpose of this study was to determine the degree to which U.S. dental hygiene programs are incorporating cultural competency education into the dental hygiene curriculum and to identify associated program characteristics.

**Methods:** A 19 item survey was electronically administered to all 334 U.S. dental hygiene program directors. The questionnaire solicited information on teaching and evaluation methodologies relative to cultural competency education (CCE), as well as director's perceptions and program demographic information.

**Results:** An overall response rate of 27% was obtained. The majority of participating programs (92%) reported incorporating CCE into the curriculum in some form. Most responding directors indicated that CCE has been effectively integrated into the curriculum. A variety of curricular methods are being employed to teach CCE with lectures being the most common method utilized. Results of this study suggest that an overwhelming number of responding programs (98%) participate in community outreach/service learning projects. However, nearly half (42%) indicated that their students are not evaluated for culture competency knowledge, skills and attitudes.

**Conclusion:** These findings imply that responding programs are incorporating CCE into the curriculum using a variety of teaching methodologies with an emphasis on community outreach/service learning projects. It is important to consider whether or not community outreach/service learning projects improve dental hygiene students' cultural competency skills, attitudes and knowledge. Future research efforts should aim to describe the value and effectiveness of such programs at achieving cultural competence.

**Keywords:** cultural competence, diversity, dental hygiene, curriculum

This study supports the NDHRA priority area, **Professional Education and Development:** Evaluate the extent to which current dental hygiene curricula prepare dental hygienists to meet the increasingly complex oral health needs of the public.

### INTRODUCTION

The U.S. population is becoming increasingly more diverse. According to data from the U.S. Census Bureau, ethnic minorities account for almost one-third of the current U.S. population and are expected to make up 54% of the total U.S. population by 2050.<sup>1,2</sup> These estimations suggest that in the near future, many patients seeking dental care will be from culturally and ethnically diverse groups.

The U.S. Surgeon General's Oral Health in America Report discusses how race and ethnicity play a role in a person's ability to access oral health care.<sup>3,4</sup> As a result, the United States Health and Human Services (HHS) developed an action plan outlining the need for a workforce and health care system able to identify racial and ethnic health disparities and develop sensitivity for culture and eth-

nic differences.<sup>5</sup> This action plan continues to be a top priority for HHS, as objectives in their Healthy People 2010 and Healthy People 2020 documents describe an oral health workforce that can meet the needs of all citizens of the U.S.<sup>6,7</sup>

Cultural competence has been highlighted in the literature as a key component in addressing the needs of a diverse society and reduce health disparities among diverse populations.<sup>3-7</sup> One of the most widely accepted definitions of cultural competency emerges from the pediatric mental health literature: "a set of congruent behaviors, attitudes, and policies that come together in a system, agency or amongst professionals and enables that system, agency or those professionals to work effectively in cross-cultural situations."<sup>8</sup> The process by which

students acquire the necessary attitudes, beliefs and skills in order to deliver culturally competent care is known as Cultural Competency Education (CCE).<sup>9-12</sup>

Educational and professional organizations have recognized the need for cultural competency education and responded through formal educational recommendations and standards.<sup>13-17</sup> The American Dental Association (ADA) encourages cultural competency amongst its members, stating that dental professionals must possess the expertise and skills needed to provide services to a growing diverse patient population.<sup>18</sup> The American Dental Hygienists' Association (ADHA) in its Standards for Clinical Dental Hygiene Practice document directs dental hygienists' to recognize diversity and integrate cultural and religious sensitivity in all professional interactions.<sup>19</sup> As the voice of dental educators, the American Dental Education Association (ADEA) contends that dental education institutions have a "distinct responsibility to educate dental and allied dental professionals who are competent to care for the changing needs of our society."<sup>20</sup>

The accrediting body for dental and dental hygiene programs, the Commission on Dental Accreditation (CODA), has established accreditation standards addressing cultural competency education.<sup>16,17</sup> CODA contends that "dental and dental hygiene graduates must possess the necessary interpersonal and communication skills needed to successfully interact with and further manage a diverse patient population."<sup>16,17</sup> Consequently, a newly revised Dental Hygiene Standard 2-15 was implemented January 1, 2013, and states, "dental hygiene graduates must be competent in interpersonal and communication skills to effectively interact with diverse population groups and other members of the health care team."<sup>17</sup> As a result of these recent initiatives, dental hygiene programs across the country are trying to identify the most effective means of incorporating this content into the curriculum.

### **CCE in the Curricula**

Studies in medicine, dentistry and other health care professions have been conducted to determine the extent to which CCE has been incorporated into professional programs.<sup>21-26</sup> The literature suggests that most U.S. dental schools have integrated some form of CCE into the dental curricula.<sup>23-25,27-30</sup> A 2006 survey of U.S. dental schools found that 91% of the responding dental schools had some form of cultural competency instruction in their curricula.<sup>24</sup> The majority of these dental schools reported that

cultural competency has been integrated into existing dental courses with specific goals and objectives.<sup>24,25</sup> These results pre-date the newly revised CODA standards for dental and dental hygiene programs. Updated data is needed to identify if these statistics have changed since the implementation of the new CODA standards in 2013.

### **Conceptual approaches for CCE**

According to Betancourt et al, cultural competency education pedagogy can be divided into 3 conceptual approaches: cultural sensitivity approach, multicultural or categorical approach, and the cross-cultural approach.<sup>21</sup> Each of these approaches concentrates on a different aspect of CCE, attitudes, knowledge and skills.<sup>21</sup> The cultural sensitivity approach focuses on the attitudes of the provider or student as they relate to culture influences of the patient and their health beliefs and practices.<sup>21</sup> A 2008 dental study by Rubin et al employed this approach. Outcomes of that study found significant differences in student cultural competency attitudes after participating in service learning experiences.<sup>23</sup>

The multicultural or categorical approach of cultural competency focuses on the knowledge of values, beliefs and behaviors of certain cultural groups.<sup>21</sup> Because traditional educational methodologies are utilized in this approach, such as lectures and group discussions, to increase knowledge, it may be the easiest to utilize.<sup>21</sup> This approach was used in a 2008 study by Pilcher et al to determine if curricular changes would increase dental students' knowledge of cultural competency topics.<sup>27</sup> In this study, students were asked to complete an online survey before and after exposure to the cultural competency content of the didactic components of the dental curriculum. Based on the findings, Pilcher et al concluded that curricular changes had produced changes in the students' knowledge of cultural competency topics.<sup>27</sup>

Betancourt et al claim that the cross-cultural approach focuses on clinical skills related to the ability to care for diverse populations.<sup>21</sup> Dental researchers Broder et al utilized this approach in their 2006 study employing trained patients or patient instructors to act out real life cultural scenarios, coupled with self-reflection exercises to teach students how to effectively interview and communicate with patients in a clinical setting.<sup>28</sup> These researchers concluded that the use of patient instructors is an effective instructional method for enhancing students' interpersonal communication skills but not an effective tool for enhancing students' clinical

interviewing skills.<sup>28</sup> Broder et al further concluded that the use of reflective learning after each patient instructor encounter is a critical element for students to recognize their own cultural biases, a key element in the cultural competency continuum.<sup>28</sup>

### **Instructional and Evaluation Methods for CCE**

An array of instructional methods has been utilized by health care educational programs to teach CCE. Lectures/seminars seem to be the preferred curricular method.<sup>24,25</sup> Case studies, small group discussions, and community outreach/service learning programs are also popular methods. To a lesser extent vignettes, problem-based learning, and role play exercises are also employed to teach cultural competency.<sup>24,25</sup> Due to limited research on CCE in dental hygiene, very little is known about the instructional methods used by dental hygiene programs to teach CCE.

Like instructional methods, a variety of evaluation measures have been employed to assess student attainment of cultural competency. While several types of evaluation have been reported, each seems to be dependent on the approach used to teach CCE.<sup>22,24,27</sup> According to their 2006 study of U.S. dental schools, Saleh et al reported written exams and direct observation by faculty to be the most common forms of evaluation.<sup>24</sup> Gregorczyk et al concluded in a 2008 assessment of methods of evaluating CCE that "there are no widely accepted instruments to evaluate health professions students' cultural competency knowledge."<sup>31</sup> What seems to be missing in the literature regardless of discipline, is long-term outcome assessment for cultural competency knowledge, skills and attitudes.

### **The Need for CCE Research in the Dental Hygiene Curricula**

While the literature suggests that CCE has been incorporated into professional health care programs, it provides little information regarding the status, strategies and guiding measures of cultural competency education in U.S. dental hygiene schools. Further studies are needed to examine to what extent dental hygiene programs are incorporating cultural competency education into the dental hygiene curriculum and if the characteristics of the dental hygiene program impact the degree to which cultural competency education is incorporated. Therefore, the purpose of this study is to determine the degree to which U.S. dental hygiene programs are incorporating cultural competency

education into the dental hygiene curriculum and to identify associated program characteristics.

## **METHODS AND MATERIALS**

A survey instrument patterned after previous dental studies by Saleh et al<sup>24</sup> and Rowland et al<sup>25</sup> was developed by the principle investigator and a team of experienced researchers. The questionnaire was distributed in electronic format to 334 dental hygiene program directors in the U.S. The questionnaire consisted of 19 questions which covered topics related to curricular methods, evaluations measures, program goals and implementation of CCE as well as perception and demographic questions. While all questions were forced-choice for ease of data analysis, participants were given the opportunity to provide additional information for 5 questions. Following Institutional Review Board approval, the survey was pilot tested by 5 U.S. dental hygiene program directors for question content, clarity and understanding. Based on feedback received from the pilot group, revisions were made to the survey.

An invitation to participate in the study was electronically delivered to the email addresses of the 334 U.S. dental hygiene program directors which were obtained from ADHA. The email directed participants to a URL with instructions on how to access the questionnaire, complete the survey and electronically return responses as provided by SurveyGizmo.com<sup>®</sup>. Two weeks after the initial email message was sent, a second message was sent to program directors inviting them to participate in the study if they had not already done so. All responses were anonymous to the principle researcher and delivered back via an Excel file created by SurveyGizmo<sup>®</sup>. All data values were provided in aggregate form. Data sets were analyzed using descriptive statistics. Additionally, Chi-Square analyses utilizing Statistics Package for the Social Sciences (SPSS) version 22 (IBM Corporation, 2011) was conducted on 2 questions to determine if relationships existed between several variables and programs that have CCE as an overall program learning outcome and specific learning objectives for community outreach/service learning programs.

## **RESULTS**

Sixty-eight (76%) Associate of Science programs and 21 (24%) Bachelors of Science programs returned the questionnaire for an overall response rate of 27%. Nearly half (47%) reported their last CODA site visit was within the last 3 years. While cultural competency encompasses far more than cultural, racial and ethnic diversity, study participants were asked to rate the diversity of patient



Table I: Diversity of Population Served by Dental Hygiene Program

	Patient	Student
Not Diverse (less than 10% of patient/student population is culturally/racial/ethnically diverse)	3.4%	25.8%
Slightly Diverse (10 to 20% of patient/student population is culturally/racial/ethnically diverse)	14.8%	36.0%
Diverse (20 to 30% of patient/student population is culturally/racial/ethnically diverse)	33%	15.7%
Very Diverse (30 to 40% of patient/student population is culturally/racial/ethnically diverse)	18.2%	12.4%
Extremely Diverse (over 40% of patient/student population is culturally/racial/ethnically diverse)	34.1%	12.4%

and student populations served by their institutions based on these factors alone. A close examination of Table I reveals that the majority of responding program directors (84%) rated the patient population served by their program as diverse, very diverse or extremely diverse (20% or greater of patient population is culturally/racial/ethnically diverse). In contrast, 61% of program directors rated the student population served by their program as not diverse or slightly diverse (20% or less of student population is culturally/racial/ethnically diverse) (Table I).

When asked about the presence of cultural competency in the curriculum, 91% reported that CCE has been incorporated into the curriculum in some manner, with 83% of programs reporting cultural competency is addressed as an overall program learning outcomes. Only 9% of the responding programs reported that CCE had not been incorporated into the curriculum, with a majority (75%) reporting plans to incorporate CCE in the future. Of the programs who had already incorporated CCE into the curriculum, 3 top reasons were given for doing so, including:

1. Reporting diverse patient populations served by the program (54%)
2. Reporting accreditation requirements (35%)
3. Reporting leadership/administration commitment to cultural competency/diversity issues (23%)

Conversely, of the remaining 9% who indicated that their programs had not incorporated CCE, 50% of those reported not having enough curricular time to cover topics. Additionally, 43% reported a lack of faculty expertise or training in the subject matter, and 33% indicated limited financial resources as their primary reasons for not incorporating CCE into the curriculum.

Program directors were asked several questions

relating to their program's CCE curriculum, including primary approach or goals (skills, attitudes and knowledge) for CCE, types of courses offered, as well as teaching and evaluation methods for CCE. Improvement of students' skills to treat diverse patient populations (52%) was the most reported approach or goal for CCE, followed by increasing student's attitudes or self-awareness of prejudices or biases towards other cultures (32%) and enhancing student's knowledge of other cultures (11%). A select few (5%) indicated that their programs did not have a specific approach or goal for their CCE curriculum.

Seventy-two percent of the responding program directors reported CCE has been incorporated into existing dental hygiene courses with specific goals, objectives and evaluation methods for cultural competency. Twenty-eight percent reported CCE had been incorporated into existing dental hygiene courses but without specific goals, objectives and evaluation methods for cultural competency. Only 8% indicated that CCE had been incorporated into a separate, independent dental hygiene course. Lectures/seminars (83.1%) and community outreach programs (76.4%) were the most frequently reported teaching methods for CCE. Problem-based learning (25.8%) and the use of videos or vignettes (21.8%) were the least frequently reported teaching methods (Table II).

Ninety-nine percent of the responding program directors indicated that their students participate in some type of community outreach/service learning program. A variety of community outreach/service learning projects were reported with health fairs (86%) topping the list (Table III). Fifty-four percent of the programs reported having specific learning objectives related to cultural competency for community outreach/service learning activities, however numerous directors (42%) indicated that their students are not formally evaluated during community outreach/service learning projects.

Table II: Curricular Methods

Method	Percent
Lectures/seminars	83.1%
Role play exercises	39.3%
Case studies or case based learning	61.8%
Presentations by community members	31.5%
Problem-based learning	25.8%
Small group discussions (2-10 students)	49.4%
Students journals; Self Reflection pieces	42.7%
Guided discussions - large group discussions (20 or more students)	40.4%
Patient observations	38.2%
Recorded media materials, such as Videotapes(vignettes)	21.3%
Community outreach / Service learning programs	76.4%
Other: <ul style="list-style-type: none"> <li>• Study abroad/ Mission trips</li> <li>• Spanish dental terms program</li> <li>• Multicultural potluck</li> <li>• Global issues papers</li> <li>• Student projects/presentations</li> <li>• Small group presentations</li> </ul>	14.6%

A small group (19%) indicated that their students are evaluated in all 3 constructs: attitudes, skills and knowledge.

Participants were asked a number of perception questions related to the incorporation of CCE into the curriculum. A Likert scale ranging from very effective (1) to very ineffective (5) was utilized for programs directors to rate incorporation of CCE into the curriculum. A large majority (85%) felt that their program had been effective or very effective at incorporating CCE into the existing dental hygiene curriculum. When asked to rate the importance of CCE to their dental hygiene program, 93% rated CCE as important or extremely important.

The Fishers Exact Test was conducted to determine if relationships existed between several program demographics and the responses given. Table IV summarizes the proportions of programs with or without program learning outcomes for cultural competency across several different program characteristics. Statistically significant relationships were found between programs who had program learning outcomes for CCE and directors who rated their programs' incorporation of CCE into the curriculum as effective or highly effective( $\chi^2=28.046$ ,

Table III: Dental Hygiene Student Participation in Community Outreach/Service Learning Projects

Type of Program	Participation (Percent)
Career Fairs	52.8%
Health Fairs	86.5%
Direct Patient Care at a Community/Public Dental Health Clinic	75.3%
Direct Patient Care at an Alternative Practice Setting (Elementary School, Nursing Home, Hospital, Community Center)	46.1%
Target Group Presentations (Elementary School, Nursing Home, Hospital, Community Center)	83.1%
Special One Day or Weekend Oral Health Community Service Events (Sealant Saturday, National Dental Health Month)	76.4%
Give Kids a Smile Events	61.8%
Other (Care Harbor Events, Mission Trips, Mobile Dentistry Events, Remote Area Medical, Special Olympics, Healthy Smiles Events)	15.7%

$p=0.000$ ). Programs that had program learning outcomes for CCE were also more likely to have specific learning objectives for CCE in community outreach/service learning programs ( $\chi^2=12.651$ ,  $p=0.000$ ). This suggests that programs who have overall program learning outcomes for CCE are more likely to perceive that their program had effectively incorporated CCE into the curriculum and have specific learning objectives for CCE in community outreach programs. Type of degree awarded, diversity of patient or student population, and directors' rating of importance of CCE was not associated with having program learning outcomes for CCE.

Table V shows the proportional relationships between programs with or without specific learning objectives for CCE for community outreach/service learning programs and several program characteristics. A statistically significant relationship was found between programs who had specific learning objectives for CCE in community outreach/service learning programs and programs who indicated that CCE was addressed as one of their overall program learning outcomes ( $\chi^2=12.651$ ,  $p=0.000$ ). Programs who had specific learning objectives for CCE in community outreach/service learning pro-

Table IV: Relationship of Predictor Variable to Programs with or without Program Learning

Predictor Variable	Outcomes for cultural competency			
	Is cultural competency addressed as one of your overall Dental Hygiene Program Learning Outcomes? <b>NO</b>	Is cultural competency addressed as one of your overall Dental Hygiene Program Learning Outcomes? <b>YES</b>	<b>X<sup>2</sup> (+)</b>	<b>p-value</b>
Program directors who rated CCE as somewhat important or extremely important (Q2)	87%	95%	1.208†	0.270
Program directors who rated CCE program as effective or very effective (Q6)	38%	95%	28.046†	<b>0.000</b>
Programs that have specific learning objectives for CCE for Community Outreach or Service Learning programs (Q14)	13%	64%	12.651†	<b>0.000</b>
Programs that award a Bachelor of Science (BSDH) degree (Q17)	7%	28%	2.943†	0.106
Program directors that rated the patient population served by their program as very diverse or extremely diverse. (Q18)	29%	53%	2.903†	0.143
Program directors that rated the student population served by their program as very diverse or extremely diverse. (Q19)	20%	25%	0.149†	1.000

Statistically significant was set at  $p < 0.05$

**Bold** indicates statistically significant

(†)=Fishers Exact Test

grams were also more likely to have program directors who rated incorporation of CCE into the curriculum as effective or very effective ( $\chi^2=12.83$ ,  $p=0.000$ ) and have very diverse or extremely diverse patient populations ( $\chi^2=4.805$ ,  $p=0.048$ ). Type of degree awarded, diversity of student population or directors' rating of importance for CCE had no impact on whether or not a program had specific learning objectives for CCE in community outreach/service learning programs.

## DISCUSSION

With an increasingly diverse population, coupled with a very slow increase in the diversity of students in the allied health professions, the need to educate a workforce that can better address the oral health care needs of a diverse society is critical.<sup>1-7,25</sup> As per accreditation standards, today's dental hygiene graduates must possess the interpersonal and communication skills needed to successfully interact with and manage a diverse patient population.<sup>17</sup> This study sought to examine the level to which U.S. dental hygiene programs are incorporating CCE into the curriculum.

Results of this study indicate that more dental hygiene programs have incorporated CCE into the curriculum (91%) than those who have not (9%). Similar to dental schools<sup>24,25</sup> most (72%) dental hygiene schools incorporate CCE into other courses with specific goals, objectives and evaluation measures for cultural competency. The results of this study are comparable to the 2006 study findings by Saleh et al, who reported that only 4.5% of U.S. dental schools offer a separate, independent course in cultural competency.<sup>24</sup> Similarly, this current study revealed that 8% of the reporting programs offer a separate, independent course. Due to the self-reporting nature of this study, programs may over or under rate their incorporation of CCE. However, the findings do suggest that dental hygiene programs find cultural competency to have value and relevance.

Demographic findings related to diversity of patient and student populations were not surprising. The results, like the results from previous dental studies,<sup>24,25</sup> hint at a diverse patient population being served by a dental hygiene student population who lacks cultural and ethnic diversity. Further re-



Table V: Relationship of Predictor Variable to Programs with or without Specific Learning

Predictor Variable	Objectives for CCE for Community Outreach/Service Learning Programs			
	Programs that do <b>not</b> have specific learning objectives for CCE for Community Outreach or Service Learning programs	Programs that have specific learning objectives for CCE for Community Outreach or Service Learning programs	X <sup>2</sup> (+)	p-value
Programs who have cultural competency addressed as one of their overall Dental Hygiene Program Learning Outcomes (Q1)	66%	96%	12.651†	<b>0.000</b>
Program directors who rated CCE as somewhat important or extremely important (Q2)	87%	98%	3.647†	0.089
Program directors who rated CCE program as effective or very effective (Q6)	68%	98%	12.83†	<b>0.000</b>
Programs that award a Bachelor of Science (BSDH) degree (Q17)	18%	30%	1.769†	0.215
Program directors that rated the patient population served by their program as very diverse or extremely diverse. (Q18)	37%	61%	4.805†	<b>0.048</b>
Program directors that rated the student population served by their program as very diverse or extremely diverse. (Q19)	23%	24%	0.008†	1.000

Statistically significant was set at p<0.05

**Bold** indicates statistically significant

(+)=Fishers Exact Test

search is warranted to investigate why students from ethnically and racially diverse populations are not seeking allied health professions such as dental hygiene as a career choice.

The reasons for incorporating CCE into the curriculum were also not surprising. Serving a diverse patient population was the most frequently reported reason for incorporating CCE, followed by accreditation requirements. It would appear that dental hygiene programs are aware of and responding to the needs of their patients by including cultural competency topics into the curriculum. Since 47% of the responding programs had a CODA site visit within the last 3 years, this might suggest dental hygiene programs are responding to recent accreditation standard changes relating to cultural competence issues.<sup>17</sup>

This study elicited program directors perceptions on CCE and if these perceptions translate to incorporation of CCE into the curriculum through program learning outcomes, teaching methods and evaluation measures. Study findings on perception questions imply that program directors appreci-

ate CCE and most perceive CCE to be an important aspect of the dental hygiene curriculum. The findings also allude to a perception from program directors that their own programs have effectively incorporated CCE into the curriculum, which may be a reason for the majority of programs indicating they have CCE addressed as an overall program learning outcome and have community outreach/service learning programs with objectives for CCE. Further long- term investigations are warranted to see if positive correlations can be established between director's perceptions of CCE and the incorporation of CCE into the curriculum.

A 2003 medical study by Dolhun et al,<sup>22</sup> and 2006 dental studies by Saleh et al<sup>24</sup> and Rowland et al<sup>25</sup> revealed considerable variations in curricular approaches and course content related to CCE in U.S. medical and dental schools. This study of U.S. dental hygiene programs yielded similar results finding dental hygiene programs to be employing an array of curricular methods to teach CCE. Like the findings from earlier studies on CCE in professional programs,<sup>24,25</sup> most dental hygiene programs (83%) rely on lectures/seminars to in-

roduce cultural competency concepts. Pilcher et al concluded lectures/seminars enhance knowledge of CCE concepts.<sup>27</sup> With over half of the programs (52%) indicating that their program's primary goal for CCE is to improve students skills to treat diverse populations, clearly, dental hygiene programs need to align their teaching methods to their CCE curriculum goals. The findings from this study indicate that 76% of programs have their students participate in some type of community outreach/service learning programs, which according to Betancourt et al do enhance skills.<sup>21</sup> However, these results point to a wide variance in the type of community outreach/service learning programs employed by U.S. dental hygiene programs (Table III). Of further interest is the fact that 54% of programs have specific learning objectives for CCE in community outreach/service learning programs but much fewer (42%) go on to evaluate their students during these programs. This finding could be problematic for dental hygiene programs, as it is up to individual programs to demonstrate accreditation standards related to CCE are being met. Further studies need to focus efforts on determining how programs are evaluating cultural competency knowledge, skills and attitudes of students. Although cultural competency skills and attitudes can often be difficult to access and evaluate, the importance of outcome assessment cannot be under stated, as the results of this study indicate that dental hygiene programs could be lacking in this area. Additional research is indicated to determine the long-term effects of dental hygiene programs' efforts to incorporate cultural competency education into the curriculum.

Other studies have not investigated program directors' perceptions of effectiveness of incorporation of CCE. As expected, the results of this study indicate that programs who had overall program learning outcomes for CCE were more likely to have directors who feel that they had effectively incorporated CCE into the curriculum. They were also more likely to have specific learning objectives related to CCE in community outreach programs. The results suggest that program directors perception of importance of CCE, student diversity, type of degree awarded by the program had no influence on a programs program learning outcomes status and specific learning objectives for community outreach/service learning programs. One might expect that a program with a diverse patient population would have program learning outcomes for treating a diverse population. Surprisingly, this study found that a program's program learning outcomes status was not affected by program demographics such as patient diversity. This study did however find a positive correlation between programs

who had specific learning objectives for community outreach/service learning programs and having a diverse patient population. Similar correlations were found by dental researchers Rowland et al who concluded that dental schools are offering CCE courses to meet the needs of a diverse patient population. The results of this study are promising and suggest that dental hygiene programs are incorporating CCE into their existing curricula.

This study is limited by the self-reporting nature of the study and overall response rate of 27%. The timing and electronic distribution of this survey, as well as large numbers of survey requests that directors receive maybe responsible in part to the low response rate. This survey was emailed to each U.S. dental hygiene program director in the first part of the spring semester. Future researchers should consider mailing surveys and conduct follow up personal interviews, which may increase the overall response rate.

## CONCLUSION

In this descriptive study of CCE in U.S. dental hygiene schools, the findings suggest that U.S. dental hygiene programs value CCE and are making efforts to incorporate CCE into the curriculum. Variations in teaching methods and evaluation for CCE measures were found. In addition to differences in teaching methodology, this study found that dental hygiene programs rely on community outreach/service learning as a way of introducing CCE concepts without formal evaluation of knowledge, skills or attitudes. This finding provides evidence that further research is needed to determine if dental hygiene programs are sending their students to community outreach/service learning programs as a way to meet new accreditation requirements for CCE and/or simply as a way to enhance the students' sensitivity to cultural competency as a whole. Further long-term studies are warranted and should be aimed at determining the extent and effectiveness of community outreach/service learning programs to produce changes in students' attitudes, skills and knowledge as it relates to CCE. Additionally, further studies are indicated in the area of outcome assessment for CCE to determine if the curricular methods employed by dental hygiene programs are making a difference in the cultural competency of U.S. Dental Hygiene students. The focus of further studies should be on types of assessments or evaluation methods used to measure cultural competency. This may assist in the development and establishing standards for incorporating CCE into the curriculum. Future research efforts

should also be directed at identifying potential barriers that may hinder diverse student populations from seeking dental hygiene as a profession.

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# ADHA/SIGMA PHI ALPHA JOURNALISM AWARD: BACCALAUREATE

## Oral Health and Hospital-Acquired Pneumonia in Elderly Patients: A Review of the Literature

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### Abstract

**Purpose:** The U.S. spends an average of \$6.5 billion each year to treat patients who suffer from pneumonia. Pneumonia currently has the highest morbidity and mortality rates of all nosocomial infections, is hypothesized to account for 15% of all hospital-acquired illnesses and is responsible for 13 to 48% of all nursing home-associated illnesses. For years, researchers have tried to develop methods to prevent pneumonia because of its detrimental effects on the body, but only in the last decade have they been able to uncover possible methods to do so. Inadequate oral hygiene care is one of the ways that elderly patients contract hospital-acquired pneumonia (HAP). Proper oral disease prevention could possibly be considered the standard of care in long-term stay facilities to reduce and prevent elderly patients from contracting HAP. The purpose of this literature review is to explore the relationship between oral health care practices and HAP.

**Keywords:** periodontal disease, pneumonia, elderly patients, dental hygiene educators

This study supports the NDHRA priority area, **Health Services Research:** Determine the extent to which dental hygienists' working in collaborative practice settings with other health professionals or organizations improves the cost-effectiveness and quality of health care outcomes.

### INTRODUCTION

Periodontal disease is an inflammatory response to a continual source of bacteria that if left untreated can cause severe destruction to the oral tissues and surrounding structures.<sup>1</sup> It is a commonly found infection in elderly patients that can disturb the host's immune system and potentially impact systemic illnesses.<sup>2</sup> The prevalence of American adults who suffer from periodontal disease has been linked to an increase in age, with 47% occurring in younger adults and 70% occurring in elderly adults.<sup>3</sup> Within the past decade, there have been several research studies suggesting periodontal disease to be a major risk factor for hospital-acquired pneumonia (HAP).<sup>2,4-11</sup> Oral bacteria can be easily aspirated into the respiratory tract and can encourage the development of future systemic diseases, like HAP.<sup>2,4-6</sup>

HAP is a contracted lung infection that produces a positive respiratory culture after 48 hours of being in the primary care of a hospital facility.<sup>6-7,12</sup> It is an inflammatory condition of

the lungs that is influenced by infectious agents that are not present at the time of hospital admittance.<sup>13</sup> Current research suggests that HAP occurs in 5 to 10 patients out of 1,000 admitted hospital patients.<sup>14-16</sup> The incidence of HAP cases increases as much as 6 to 20 fold in patients with mechanical ventilation.<sup>14-16</sup> Although the mortality rate of patients with HAP may be as prevalent as 70%,<sup>17,18</sup> approximately 30 to 50% can be attributed to infection. It has been found that the mortality rate could possibly increase even further from bacterial pathogens being present.<sup>19,20</sup>

Bacterial pneumonia, which is a form of HAP, is usually caused by resistant periodontal pathogens, such as *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Escherichia coli*.<sup>4,5,12,21</sup> These particular strains of resistant periodontal pathogens in conjunction with risk factors such as smoking, aging and heightened stress levels can increase the risk of contracting HAP in an elderly

patient.<sup>4-6,12</sup> Resistant pathogenic bacteria that forms in response to periodontal disease supplies the respiratory tissues with all of the armamentarium it needs to develop HAP.<sup>4-6</sup>

### **Periodontal Disease**

Periodontitis is a chronic infectious inflammatory disease that negatively impacts the periodontium and destroys the remaining tooth-supporting structures.<sup>1</sup> Periodontitis is also a bacterially-induced disease that occurs in the oral cavity.<sup>1</sup> Periodontal-diseased pathogenic bacteria have the ability to gain entry into a patient's lungs by specific pathways, with the most common way via aspiration of the oropharyngeal secretions by way of endotracheal intubation or mechanical ventilation.<sup>7,22-23</sup> Of the periodontal bacteria commonly found in the oral cavity and respiratory tracts, *K. pneumoniae* is the most common pathogen to cause HAP and ventilator-associated pneumonia (VAP), followed by *Streptococcus pyogenes*, *Staphylococcus aureus*, *Peptostreptococci* species, *Actinomyces* species, *K. pneumoniae*, and *Prevotella aeruginosa*.<sup>5,8,12,24</sup> According to the CDC, approximately 63% of all patients admitted to the Intensive Care Unit (ICU) in 2009 had colonization of a periodontal pathogen in their pulmonary tract and 76% of all patients that required ventilator-breathing assistance had the same bacterial colonization present in both their mouth and lungs.<sup>25</sup>

### **Pneumonia Epidemiology**

In 2004, the American Thoracic Society (ATS) and the Infectious Disease Society of America (IDSA) published a document explaining the new evidence-based guidelines and management of HAP, VAP and health care-associated pneumonia (HCAP).<sup>23</sup> HAP was described as a type of pneumonia that occurs in patients at least 48 hours after hospital initiation that was not present prior to admittance; VAP was referred to as a type of pneumonia that occurs at least 48 hours after endotracheal intubation has occurred; and HCAP includes patients that live in nursing homes, long-term care facilities, receiving parenteral antimicrobial therapy, chemotherapy, and wound care within 30 days after the patient has been successfully treated for pneumonia for 90 days.<sup>23</sup> Endotracheal intubation and mechanical ventilation are the most common risk factors to developing HAP and VAP conditions.<sup>23</sup>

Endotracheal intubation is a procedure performed by means of a tube being inserted through the oral cavity to the trachea.<sup>9</sup> If the tube is inadvertently placed into the esophagus and stomach, aspiration of the stomach contents can result in HAP.<sup>9</sup> Mechanical ventilation is attributed to the ventilating machine that circulates oxygen for the patient to breathe.<sup>9</sup> According to the ATS and IDSA, 90% of mechanically ventilated patients in the ICU were diagnosed with VAP.<sup>23</sup> A study at the University of North Carolina reported on a hospital-wide surveillance of nosocomial infections that examined the pathogens causing VAP and nosocomial pneumonia in non-intubated patients over the course of 3 years.<sup>23</sup> In the study, investigators isolated 92% of pathogens from mechanical ventilation and 77% of pathogens from non-ventilated patients with pneumonia infections.<sup>23</sup> The study also found that some bacterial organisms, such as Medicine-Resistant Systemic Antibiotics (MRSA) and *K. pneumoniae*, were found more commonly in non-ventilated patients, whereas certain resistant gram-negative bacilli were more common in patients with VAP.<sup>23</sup> Other common risk factors seen in patients with HAP and VAP are non-modifiable and modifiable risk factors.<sup>23</sup>

### **Non-Modifiable Risk Factors**

The non-modifiable risk factors are those that are not easily modified or changed by the patient. These non-modifiable risk factors include: a patient's gender, age, history of Chronic Obstructive Pulmonary Disease (COPD), presence of a tracheotomy or cranial trauma, recent neurologic surgery, acute respiratory distress, multiple organ system failure, cerebral palsy, weakened immune system, and impaired consciousness.<sup>8,26-28</sup> Although these risk factors cannot be modified by the patient, periodontal disease can be modified and prevented with adequate oral hygiene care. Scannapieco et al found that elderly patients frequently experience health consequences from poor oral health and will therefore be at a higher risk for developing localized infection, endocarditis and HAP.<sup>10</sup>

Medical risk factors seen commonly in elderly patients are those with a somewhat diminished salivary flow, depressed cough reflex, dysphagia and have the inability to perform acceptable oral hygiene.<sup>4,28</sup> Terpenning et al found a positive correlation between 8 medical factors and their incidental risk of causing HAP in elderly



patients.<sup>28</sup> Of the 8 medical risk factors discovered in the study, dysphagia, was considered to have the strongest association to HAP.<sup>2</sup>

Dental risk factors that are frequently seen in elderly patients directly coincide with the number of decayed teeth, active periodontal disease, appearance of resistant periodontal disease pathogens and the need for feeding tube assistance for sufficient nutritional requirements.<sup>4</sup> Scannapieco et al reported there to be insufficient oral hygiene protocols in both hospitals and long-term care facilities.<sup>21</sup> Furthermore, not having an oral hygiene protocol for an elderly patient that has active periodontal disease could support the progression of the induction to oropharyngeal bacterial colonization by potential periodontal pathogens.<sup>21</sup> Investigators have found that having a higher dental plaque count can further increase the risk of HAP in an elderly patient.<sup>4-6,21-22,28-30</sup>

Sjogren et al found that utilizing preventive methods is a successful way to decrease respiratory infections in elderly patients.<sup>31</sup> They also found there to be benefits of proper oral hygiene in pneumonia and respiratory infections in HAP patients.<sup>31</sup> The study's results showed that the absolute risk of respiratory illness was reduced to 6.6 to 11.7% of all HAP patients when proper oral hygiene was used.<sup>31</sup> From this study, it was also concluded that 1 out of every 10 pneumonia-related nursing home deaths could have possibly been prevented by the patient's oral health status.<sup>31</sup>

### **Modifiable Risk Factors**

Modifiable risk factors for HAP and VAP patients is a targeted area of concern that can be improved through increased education and interdisciplinary collaboration. As stated in the ATS and IDSA document, there are several areas that can be improved to prevent modifiable risk factors from occurring.<sup>23</sup> Using a non-invasive positive-pressure ventilation face mask can be a good alternative for patients with acute symptoms of COPD, hypoxic respiratory failure and immunocompromised hospital patients.<sup>23</sup> Improving sedation methods and utilizing protocols to quicken the ventilation weaning process have been proven successful in the reduction of VAP incidences for mechanical ventilation patients.<sup>23</sup> Similarly for endotracheal intubation patients, re-intubation has not been recommended, as it also increases the risk of VAP.<sup>23</sup> Regular aspirations of subglottic

fluids, through a purposefully designed endotracheal tube, have been shown to significantly decrease the risk of early onset VAP.<sup>23</sup>

### **Oral Hygiene Guidelines**

A protocol established by the CDC could be implemented in long-term care facilities, and includes the following procedures:<sup>25</sup>

1. Brush teeth every 12 hours with a sodium bicarbonate impregnated suction toothbrush
2. Clean the mouth every 4 hours with a foam suction swab and the prepackaged cleanser (cetylpyridinium chloride 0.05%)
3. To use a moisturizer for the lips and mouth every 2 to 4 hours

Several studies have utilized these or similar guidelines to determine if an oral hygiene protocol was necessary to reduce the prevalence of HAP and VAP.<sup>2,12,22-23,28,32-37</sup> To analyze the incidence of pneumonia as well as patient compliance, Bouadma et al added 6 strategies to his study in conjunction with the CDC's guidelines.<sup>32</sup> The strategies were: back rest elevation, tracheal cuff pressure maintenance, orogastric tube use, avoidance of gastric over-distention and proper oral hygiene.<sup>32</sup> They found that utilizing this form of provincial treatment almost doubled the success rate in patient compliance (90%).<sup>32</sup> They were also able to reduce the need of patients requiring assistance for the treatment of ventilator-associated diseases by 51% after the oral hygiene protocol was implemented.<sup>32</sup> Zurmehly et al had an even greater reduction of HAP cases in his study (62.5%) after the establishment of an oral hygiene program.<sup>33</sup> The participants in the Hutchins et al study utilized similar CDC prevention guidelines, but were instead instructed to brush their teeth with cetylpyridium chloride (which was later changed to 0.012% chlorhexidine solution), use suction swabs that were treated with hydrogen peroxide to disinfect the remaining surfaces of the oral cavity, mouth moisturizer and deep suctioning of the oropharyngeal tubules. With the oral care protocol provided, they saw an 89.7% decrease in the number of patients that contracted HAP.<sup>2</sup>

Additional prevention strategies in collaboration with the CDC's guidelines were implemented in a cohort's study, which included raising the bed 30 to 40 degrees (or as much as the patient could tolerate), executing incentive spi-

rometry testing in patients that have signs of coughing and deep breathing, and encouraging patients to become mobile as soon as possible.<sup>6</sup> Orr et al found a 45% reduction in HAP and concluded that implementing an oral hygiene protocol in long-term care facilities could save the patients up to \$65,000 in additional hospital fees.<sup>6</sup>

Chlorhexidine is a common antimicrobial used to prevent biofilm accumulation. Pajus et al estimated future research will find chlorhexidine beneficial in the reduction of bacterial colonization in patients requiring respiratory ventilation and may even decrease the need of antibiotics or shorten the patient's hospital visit.<sup>4</sup> Shi et al compared 4 different types of oral care prevention strategies which included chlorhexidine vs. placebo, tooth brushing vs. no tooth brushing, powered vs. manual tooth brushing, and other chemicals vs. placebo.<sup>34</sup> The results of this study found chlorhexidine mouth rinse to be associated with a 40% reduction of admitted pneumonia cases.<sup>34</sup> In performing a literature search of 17 studies, Roberts et al concluded that combining chlorhexidine with colistin, which is another type of antibiotic that specifically targets gram-negative bacteria,<sup>11</sup> can result in fewer pathogenic bacterial colonies developing in the patient's oropharyngeal tube and can delay the occurrence of HAP.<sup>35</sup> Pobo et al found that adding tooth-brushing to an already-existing chlorhexidine oral care protocol does not further eliminate any risk of contracting HAP when compared to using a chlorhexidine oral care protocol by itself.<sup>36</sup> Paju et al found chlorhexidine to be a useful antimicrobial for HAP oral care protocols.<sup>4,11,34-36</sup>

Prendergast et al found long-term care facility nurses to be hesitant in performing tooth brushing treatment care for endotracheal intubated patients because of its risk of increased cranial pressure diagnosis.<sup>37</sup> According to the nurses that participated in the study, the tongue scraper, power toothbrush, non-foaming tooth paste and oral moisturizers were the most effective products to use for oral hygiene on intubated patients.<sup>37</sup> Among the participants in the study that received comprehensive oral care, a decrease in bacterial conversion to oral nosocomial colonization was seen.<sup>37</sup> Subsequently, some hospitals have now hired an in-clinic registered dental hygienist.<sup>37</sup>

Oral hygiene methods for intubated patients may be compromised by the oral endotracheal

tubes, oral gastric tubes, bite blocks or the adhesive tape keeping the tubes in place.<sup>37</sup> ATS recommends the performance of effective infection control methods as well as continuous surveillance of ICU infections during prophylaxis appointments.<sup>23</sup> ATS also recommends for patients to be positioned in a semi-recumbent position rather than a supine position to prevent possible aspiration and enteral nutrition is recommended over parenteral nutrition for endotracheal intubation patients.<sup>23</sup>

## DISCUSSION

While dental hygienists cannot diagnose HAP nor VAP, they can play a pivotal role in the detection, education and implementation of prevention methodology for patients at risk in hospitals and long-term care facilities. For years, studies have affirmed that periodontal disease increases an elderly patient's risk for developing pneumonia that could potentially become fatal if not prevented and treated properly.<sup>22</sup> Research also suggests that inadequate oral hygiene is a preeminent risk factor of HAP for patients in long-term care facilities.<sup>3-6,12,28,32,34,35</sup> Pneumonia is a convoluted disease that still requires additional research, especially for elderly patients and their care providers in long-term care facilities.<sup>28,33</sup>

The link connecting inadequate oral hygiene to HAP at a microscopic level originates from periodontal pathogens colonizing in the oral cavity and living in the respiratory tract flora.<sup>5</sup> Resistant pathogenic bacteria that forms in response to periodontal disease supplies the respiratory tissues with everything it needs in order to develop HAP.<sup>4-6</sup> Most of the research available today concludes that *S. pneumoniae* is the most common bacterial source of pneumonia, followed by *S. aureus*.<sup>5,8,10,12</sup> Being able to identify potential periodontal pathogens can help prevent an at-risk elderly patient of acquiring HAP, VAP and HCAP.<sup>25</sup>

A common limitation identified in this literature review includes the lack of applied knowledge by the medical personnel and compliance by the elderly patient. For example, all medical personnel in the Bouadma et al study were provided a 3-hour continuing education course that covered extensive information about the epidemiology, morbidity, mortality, risk factors, pathophysiology and pneumonia preventative measures.<sup>32</sup> This study relied heavily on the medical personnel's ability to educate and persuade the patient to use the oral health

preventive methods properly.<sup>32</sup> The study also ultimately depended on the compliance of the patient to follow the recommended hygiene protocol.<sup>32</sup> Fortunately for Bouadma et al, the results of the study concluded that this prevention program for VAP can in fact increase the level of patient compliance.<sup>32</sup>

There are several procedures dental hygiene educators and medical providers can utilize in the prevention of HAP. Both periodontal risk assessments and oral hygiene protocols have shown success in preventing future incidences of HAP, VAP and HCAP in hospitals and long-term care facilities.<sup>5-6,22</sup> Although more research is needed to determine the causal relationship between poor oral health and HAP, pneumonia screenings and oral hygiene protocols have already been shown to be a successful treatment method in patients with diagnosed periodontal disease.<sup>4,22</sup>

In the future, collaboration of medical and dental personnel is imperative in providing paramount standards of care for elderly patients in hospitals and long-term care facilities. Establishing an oral health care protocol in long-term care facilities contributes to a multifaceted approach to prevent the risk of HAP. With education in disease prevention being a main professional goal, dental hygienists are a pivotal resource for

hospitals and long-term care facilities in providing education, prevention protocols and care to elderly patients. It is suggested for hospitals and long-term care facilities to execute an oral hygiene protocol to prevent and reduce the patient's risk of contracting HAP, VAP and HCAP.<sup>5</sup>

## CONCLUSION

Current research suggests that poor oral health in hospitals and long-term care facilities is linked to HAP. As dental care providers, we should explore the possibility of at the very least providing "in-service" training to elderly patients in hospitals and long-term care facilities. In the future, a more comprehensive approach would be for dental hygienists to actively work in hospitals and long-term care facilities to provide specialized education on oral hygiene preventative procedures. Dental hygienists are a crucial asset for hospitals and long-term care facilities in being able to contribute exemplary education for both elderly patients and their caregivers on the link between oral and systemic health.

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# WINNER: BEST PAPER AWARD

## An Assessment Model for Evaluating Outcomes in Federally Qualified Health Centers' Dental Departments: Results of a 5 Year Study

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The Journal of Dental Hygiene Best Paper Award was created to recognize the most outstanding research paper published from the previous year (2015). All original research papers published in 2015 were evaluated by a panel of judges, using specific criteria, to make the final selection. This manuscript first appeared in Volume 89, Issue Number 4 of the August 2015 issue of the Journal of Dental Hygiene.

### Abstract

**Purpose:** The purpose of this report was to establish baseline data on 10 oral health performance indicators over 5 fiscal years (2007 to 2008 through 2011 to 2012) for an Iowa health center. The baseline data provides an assessment model and reports outcomes based on the use of the model. Performance indicators show evidence of provider performance, accountability to stakeholders and provide the benchmarks required for dental management to develop future goals to improve oral health outcomes for at-risk populations.

**Methods:** Using descriptive statistic, this report extrapolated data from the Iowa Health Center's computer management systems software, HealthPro, and Centricity electronic medical records, and analyzed using IBM® SPSS® 19. This report describes the change in utilization for number and type of visits for uninsured and Medicaid patients over 5 fiscal years (a fiscal year is measured from November 1 through October 31).

**Results:** The number of patients receiving at least 1 dental visit in a measurement year showed n=81,673 procedures with 21% (17,167) being unduplicated patients. Preventive averaged 46%, restorative 18%, urgent care 22% and other procedures 14%.

**Conclusion:** Federally qualified health centers (FQHCs) with a dental component serve populations with the greatest health disparities. This population includes ethnic and racial minorities, uninsured, underinsured, rural residents, Medicaid and Medicare. Establishing baseline data for FQHCs provides a foundational tool that will allow dental management to analyze successes as well as deficiencies in the goal to provide increased utilization to oral health care for at-risk populations.

**Keywords:** oral health performance measures, practice management for community oral health, FQHCs, baseline data

This study supports the NDHRA priority area, **Health Promotion/Disease Prevention:** Investigate how environmental factors (culture, socioeconomic status-SES, education) influence oral health behaviors.

### INTRODUCTION

Federally Qualified Health Centers (FQHCs) are directed and governed by the Health Resources and Services Administration (HRSA).<sup>1,2</sup> Substantial grant moneys received by HRSA ensure FQHCs can maintain financial sustainability. Additionally, FQHCs receive these grants under Section 330 of the Public Health Service Act (PHS) and qualifies them to receive enhanced reimbursements from Medicaid and Medicare.<sup>2</sup> FQHCs are required to submit data to HRSA's Universal Data System on an annual basis.<sup>3</sup> This data tracks patient demographics, services provided, staffing, clinical indicators, utilization rates, costs and revenues of grantees at state and national levels on an annual basis. This data assists HRSA in evaluating a program's effectiveness and intervention of services to improve the health of vulnerable populations.<sup>3</sup>

Besides the number of dental procedures provided, there are no nationally accepted oral health performance indicators required by HRSA for grantees to report to the uniform data system.<sup>3</sup>

This report provides descriptive statistic based on 10 indicators developed by Healthy People 2020, HRSA, Maternal Child Health, National Quality Forum, U.S. Department of Health and Human Services (DHHS) and Crescent Community Health Centers dental management over 5 fiscal years (2007 to 2008 through 2011 to 2012). Dental management selected indicators from these developers because they are leaders in the oral health profession.<sup>2,4,5</sup> Oral health is a high priority for these organizations as they have taken the lead to develop oral health mea-

tures that reflect the needs of at-risk populations.<sup>2,6</sup> This case study offers a model for community health centers with dental departments to follow.

FQHCs with a dental component are a primary safety-net solution for vulnerable populations and help decrease the barriers and inequities at-risk populations face in accessing and utilizing oral health care.<sup>7-9</sup> The mission of FQHCs is to provide primary care to vulnerable populations in underserved areas.<sup>7</sup> The Centers for Disease Control and Prevention (CDC) maintain there are significant oral health disparities related to socioeconomic status, racial and ethnic groups, geographic locations, age, and gender.<sup>10</sup> According to the CDC, oral health disparities continue to progress in the U.S.<sup>10</sup> Socioeconomic factors contributing to these disparities include race (non-Hispanic Blacks, Hispanics, American Indians and Alaskan natives), age and education. Children ages 2 to 4 and 6 to 8, who are Black, non-Hispanic and Mexican American have twice the amount of decay as white Non-Hispanics.<sup>11</sup> Those adults with less than a high school education aged 35 to 44 have 3-times the decay as college-educated adults.<sup>11</sup> Additionally, this same group has 3-times the amount of destructive periodontal disease.<sup>11</sup>

David Satcher, Surgeon General of the U.S., issued the Oral Health in America - A Report of the Surgeon General more than a decade ago, which revealed gaps in access to oral health care, suggesting that Americans do not benefit equally from improvements in health care.<sup>12-14</sup> The goals Healthy People 2020 established under the leadership of the Federal Interagency Workgroup include improving quality of life while living free of preventable diseases, attaining health equality for all population segments, promoting environments which are conducive to health, both social and physical, and encouraging healthy behaviors through all stages of life.<sup>6</sup> Dental departments located in FQHCs play a critical role in the support of those goals by reducing barriers in obtaining oral health services hence creating a better quality of life for those individuals they serve.<sup>15,16</sup>

FQHCs are documented leaders in treating chronic diseases and reducing health disparities while maintaining affordability of care.<sup>8,17</sup> They are local, non-profit community needs-driven health care providers serving low income, medical and dental underserved communities. To date, FQHCs have served over 20 million people across the country with the primary goal to improve access to care for millions of people regardless of their insurance status or ability to pay.<sup>8</sup> Iowa is home to 14 FQHCs; of those, 12 have a dental component. FQHCs in the state of Iowa served over 180,000 individuals, providing in excess of 130,000

dental services in 2012.<sup>8,17</sup> Ninety-four percent of Iowa health center's patients have family incomes at or below 200% of the federal poverty line. The federal poverty level guidelines issued by the DHHS, recorded by year in the Federal Register, can be defined as the set minimum amount of gross income a family needs for food, clothing, transportation, shelter and other necessities and assists in determining financial eligibility for federal programs, including dental clinics of FQHCs.<sup>18</sup> The federal government defined the poverty level in 2007, for a family of 4, at \$20,650 - this number increased to \$22,350 for 2011.<sup>18,19</sup>

FQHCs provide a substantial safety net for both prevention and emergent dental care for at-risk populations. FQHCs provide a slide-fee price scale in which fees vary depending on a person's ability to pay. Ability to pay is based on annual income, family size and U.S. federal poverty guidelines.<sup>2</sup> Access to oral health care is often constrained based on financial barriers, where one resides, as well as a person's race and ethnicity. Oral health disparities widen by restricting access to care for at-risk populations. These restrictions impair quality of life, and inflict unnecessary pain and suffering on communities.<sup>20-24</sup> The presence of dental clinics in FQHCs improves access to care for low socioeconomic populations by minimizing these barriers.<sup>25</sup>

Utilization refers to the documented confirmation that patients are using services, as well as the frequency and types of visits.<sup>26</sup> Lack of utilization include:<sup>26</sup>

1. Oral health literacy
2. Provider distribution and availability
3. Financial limitations
4. Transportation, rural versus urban location
5. Ethnic and cultural preferences
6. Health related circumstances

Federally qualified dental clinics accept Medicaid patients, offer slide-fee discounts for the uninsured and provide language interpreters along with transportation.<sup>25</sup>

One of these health centers, which is located in Dubuque, Iowa (population of 57,637), serves a tri-state region including Illinois and Wisconsin border states.<sup>27</sup> According to internal statistics, this health center provided services to over 6,000 patients, 3,403 being medical and 3,497 dental. Of those, 2,438 (23%) were Medicaid, 3,018 (42%) were uninsured and 815 were homeless population.

The purpose of this exploratory study was to describe the change in utilization for number and type

of visits for Medicaid, uninsured and privately insured patients of Crescent Community Health Center's dental department for the fiscal years of 2007 to 2008 through 2011 to 2012. This report provides descriptive statistics based on 10 oral health performance indicators, developed by National Quality Forum, Healthy People 2020, HRSA, Maternal and Child Health Bureau, Health Systems Capacity Indicator and Crescent's dental management (Table I).

## Objective of Report

The objective of compiling retrospective data was to establish benchmarks for internal and external quality for dental practice management. Internal Quality is measured as:

- Identify oral health performance indicators most applicable to Crescent Community Health Center's dental department
- Attaining baseline measures
- Develop ways to improve on clinical outcomes
- Assess benchmarks for provider performance and productivity
- Recognize areas for quality improvement
- External Quality
- Ensure transparency to HRSA, Medicaid and other grantors
- Educating Crescent Community Health Center community on dental utilization
- Establish data for grant writing
- Demonstrate to stakeholders that health care services are being utilized

## METHODS AND MATERIALS

This descriptive analysis used quantitative primary data obtained through this Iowa health center's administrative records to capture longitudinal trends in type and number of patients utilizing specific oral health services for fiscal years 2007 to 2008 through fiscal year 2011 to 2012. Change in utilization for specific types of visits for Medicaid, uninsured and privately insured patients of this Iowa health center's dental department were explored. Table I illustrates the oral health performance indicators, and the developers this report was based on.

Fiscal years for this Iowa health center were defined as November 1 through October 31 for each measurement year, (e.g. one fiscal year begin November 1, 2007 and ends October 31 2008 of the following year). Two electronic medical records HealthPro and Centricity were linked to oral health procedures, demographic characteristics, such as race, gender, payer type, provider, and age at the time of service. Data were transferred to Microsoft™ Excel® spreadsheet then to IBM® SPSS® 19,

captured dental population characteristics, and oral health service data. The Massachusetts College of Pharmacy and Health Science University Institutional Review Board approved this study.

All records were de-identified to protect patient confidentiality and uphold HIPAA standards. The data included those patients who had at least 1 dental visit to the Iowa health center's dental department. Categorical variables such as age, provider type, race, gender, payer type and procedure type were collapsed for analysis in SPSS. Age ranges were constructed based on the 10 oral health performance indicators measured (Table I). Additional categories included payer type (Medicaid, uninsured, privately insured), provider type (dental hygienist or dentist), gender (male or female) and race (Caucasian, African American, Hispanic, more than one race, and Other). Procedural D-codes were divided into 4 main categories (preventive, restorative, urgent care and other). Three additional D-code categories were defined for comprehensive exams, extractions and sealants. The American Dental Association (ADA) developed a universal dental coding system for dental procedures and nomenclature (CDT) to ensure uniformity and consistency in the recording and billing for dental procedures.<sup>28</sup>

## RESULTS

To address the research objective (based on the 10 oral health indicators shown in Table I), data describes the change in utilization of preventive, restorative and urgent care procedures for Medicaid, uninsured and privately insured patients for specific age groups at the time of services from Crescent Community Health Center's dental department for the fiscal years of 2007 to 2008 through 2011 to 2012 (Tables II to XI). Data were plugged into the formulas and results reported as follows.

**Oral health indicator #1 - National Quality Forum, Healthy People 2020 OH-11 goal:** Increase the proportion of patients who receive at least one dental visit in a measurement year at a federally qualified health center.

Overall for fiscal year 2007 to 2008 to 2011 to 2012 there were n=81,673 procedures with 21% (n=17,167) being unduplicated patients. This shows an increase in unduplicated patients of 87% overall (n=1844). Figure 1 shows patient utilization percentages with preventive services averaging 46%, restorative 18%, urgent care 22% and other procedures 14%. From fiscal year 2007 to 2008 to fiscal year 2011 to 2012, there was an increase of 106% for preventive, 87% increase in restorative and a 25% increase in urgent care services.



Table I: Oral Health Indicators

Developer	Measure/Goal	Numerator	Denominator
#1: Healthy People 2020 OH-11, National Quality Forum	Increase the percent of patients who receive oral health services in a measurement year at FQHCs	Total number of unduplicated dental patients receiving at least one D-code procedure	Total number of all D-code procedures
#2: Health People 2020: OH-8, OH-14 Delta Dental National Quality Forum #1334	Increase the proportion adults and children who receive preventive services in a measurement year	Total number of preventive services by patients aged (0 to 21) and then by (22>)	Total number of preventive services by all age groups
#3: HRSA	Increase percent of sealants in a measurement year by ages (6 to 21)	Total number of (D1351) sealants by ages (6 to 21)	Total number of D-code procedures by children age category (6 to 21)
#4: Maternal Child Health, Health Systems Capacity Indicator #7b	Increase percent of dental procedures by children age (6 to 9) insured by Medicaid who received any dental service in a measurement year	Total number of dental procedures by children age (6 to 9) insured by Medicaid receiving any D-code procedure	Total number of dental procedure by children age (6 to 9) of all payer types receiving any D-code procedure
#5: Healthy People 2020 OH-1.1, National Quality Forum	Reduce the number of children aged (3 to 5) with restorative or extraction procedure while increasing preventive procedures in a measurement year	Total number of (3 to 5) year olds who received, preventive, or restoratives, or extractions, or other D-code procedures	Total number of (3 to 5) year olds who receive any D-code procedure
#6: Health Resources Services Administration	Increase percent of patients greater than or equal to 18 years of age in the target population who received D0150 in a measurement year	Total number of patients 18 and older who had a comprehensive exam (D0150)	Total number of patients of all ages who had a comprehensive exam (D0150) procedure
#7: Crescent Community Health Center management	Percent of dental procedures by provider	Total number of procedures by hygienist or dentist	Total number of procedures by all providers
#8: Health People 2020 OH:7	Increase the proportion of dental patients ages (2 to 17) that had a preventive procedure in a measurement year	Total number of preventive procedures by (2 to 17) years old	Total number of preventive procedures by all ages
#9: National Quality Forum #1388	Increase the percentage of Medicaid patients aged (2 to 21) years who had at least one dental procedure in a measurement year	Number of dental procedures for children aged (2 to 21) insured by Medicaid	Total number of dental procedures for all (2 to 21) year olds for all payer types
#10: Crescent dental management Healthy People 2020 OH:3.2	Increase Percentage of preventive visits while decreasing restorative and urgent care procedures for patients 65> in a measurement year	Number of preventive, restorative, then urgent procedures by patients aged 65>	Total number of procedures by patients aged 65>

**Oral health indicator #2 - Healthy People 2020, Oral Health-14, National Quality Forum #1334 goal:** Increase the proportion of adults (aged 22 and older) and children (aged 0 to 21) who receive preventive interventions in a measurement year.

The proportion of patients in both age groups who received preventive procedures remained stable over the 5-year measurement period. Data showed preventive procedures more than doubled from year 1 to year 5 for age group 0 to 21 from n=2,407 to n=4,850

and age group 22> from n=2,098 to n=4,415. The overall 5-year average for ages 0 to 21 was 53% and for ages 22> was 47% of all services were preventive in nature.

**Oral health indicator #3 - Health Resources and Services Administration goal:** Increase the percent of children between 6 and 21 years of age who received at least one sealant (D1351) in a measurement year.

Table II: Oral health indicator #1

Goal: To increase the proportion of patients who receive at least 1 dental visit in a measurement year at a FQHC	
Fiscal Year	Unduplicated patients/total number of all D-code procedures
2007	2,137/11,470 (19%)
2008	2,648/13,360 (25%)
2009	3,498/18,185 (25%)
2010	4,903/19,007 (20%)
2011	3,981/19,651 (20%)

Table IV: Oral Health Indicator #3

Goal: Increase the percent of children ages 6 to 21 who received at least 1 sealant (D1351) in a measurement year	
Fiscal Year	Total number of (D1351) sealants by ages (6-21)/ Total number of D-code procedures by children aged (6-21)
2007	206/2,767 (7%)
2008	317/3,806 (8%)
2009	360/4,996 (7%)
2010	413/5,662 (7%)
2011	376/5,445 (7%)

While results show sealants increased from n=206 to n=376, the proportion of sealant placement compared to all other procedures utilized remained unchanged, averaging 7% over the 5 years. These results should encourage the providers of this health center to advocate and educate parents on the preventive benefits of sealants for this age group.

**Oral health indicator #4, Health Systems Capacity Indicator #7b goal:** Increase the percent of dental visits by children (ages 6 to 9) insured by Medicaid receiving any dental service in a measurement year.

Medicaid utilization for this age group remained stable averaging 85%, while the uninsured averaged 9% and privately insured averaged 6%. The goal to increase the percent of dental visits by children (ages 6 to 9) insured by Medicaid receiving any dental service in a measurement year was not met, showing 2% decrease in Medicaid from measurement year 1 to year 5 and a 2% increase in uninsured during this same measurement period.

**Oral health indicator #5, developed by National Quality Forum, Healthy People 2020 OH-1.1 goal:** Reduce proportion of children (ages 3 to 5)

Table III: Oral Health Indicator #2

Goal: Increase the proportion of adults and children who receive preventive interventions in a measurement year		
Fiscal Year	Children aged 0 to 21*	Adults 22 and older**
2007	2,407/4,505 (53%)	2,098/4,505 (47%)
2008	3,264/5,891 (55%)	2,627/5,891 (45%)
2009	4,571/9,225 (50%)	4,654/9,225 (45%)
2010	4,844/9,118 (53%)	4,274/9,118 (47%)
2011	4,850/9,265 (52%)	4,415/9,265 (48%)

\*Total number of preventive services by patients ages 0 to 21/total number of preventive services by all age groups

\*\*Number of preventive services by patients ages 22 >/total number of preventive services by all age groups

Table V: Oral Health Indicator #4

Goal: Increase the number of dental visits by children (ages 6 to 9) insured by Medicaid			
Fiscal Year	Medicaid	Uninsured	Privately Insurance
2007	86%	8%	6%
2008	83%	11%	6%
2009	84%	9%	7%
2010	89%	7%	4%
2011	84%	10%	6%

receiving restorative or extraction procedures, while increasing preventive procedures in a measurement year.

From fiscal year 2007 to 2008 to fiscal year 2011 to 2012, preventive procedures increased from n=545 to n=865, an upturn of 59%. Restorative procedures increased 56%, while extractions decreased by 40%. Of the n=81,673 procedures of the total population, 8% (n=6,269) were from the age group 3 to 5. Of those, 87% (n=5,479) were Medicaid, uninsured at 5.5% (n=344), and privately insured 7% (n=446).

**Oral health indicator #6, developed by Health Recourses and Services Administration:** Percent and type of patients 18 years of age and older who received a comprehensive (D0150) exam in a measurement year.

This benchmark showed that, for a 5-year measurement period, there was a 27% increase in comprehensive exams for the age group 18>. In total,

Table VI: Oral Health Indicator #5

Goal: Reduce proportion of children (ages 3 to 5) receiving restorative or extraction procedures, while increasing preventive procedures in a measurement year				
Total number of preventive, restorative, extraction or other D-code services by ages 3 to 5/Total number of D-code services by ages 3 to 5				
Fiscal Year	Preventive	Restorative	Extractions	Other
2007	545/914 (60%)	110/914 (12%)	32/914 (4%)	227/914 (25%)
2008	677/1,085 (62%)	129/1,085 (12%)	17/1,085 (2%)	262/1,085 (24%)
2009	915/1,442 (63%)	171/1,442 (12%)	28/1,442 (2%)	328/1,442 (23%)
2010	886/1,461 (61%)	203/1,461 (14%)	22/1,461 (2%)	350/1,461 (24%)
2011	865/1,367 (63%)	172/1,367 (13%)	19/1,367 (1%)	311/1,367 (23%)

Table VII: Oral Health Indicator #6

Fiscal Year	Number of comprehensive exams for ages 18>/total comprehensive exams of all ages
2007	614/958 (64%)
2008	495/807 (61%)
2009	835/1,340 (62%)
2010	662/1,020 (65%)
2011	777/1,207 (64%)

there were n=54,348 procedures over the 5-year measurement period for ages 18>. Of those, 6% (n=3,383) were comprehensive exams. Payer type breaks down into 37% (n=1,248) being Medicaid, 57% (n=1,931) uninsured and 6% (n=204) privately insured. For gender, females accounted for 59% (n=2,011), and males 41% (n=1,372). For races, Caucasian accounted for 82% (n=2,752), African American 8% (n=283), Hispanic 6% (n=216), more than one race 1% (n=30), and combined races 3% (n=102).

**Oral health indicator #7 endorsed Crescent Community Health Centers dental management:**

Percent and number of dental services provided by provider type in a measurement year.

For fiscal years 2007 to 2008 through 2011 to 2012, the dental hygiene department provided 39% of all D-code services and 61% by a dentist over the 5-year measurement period.

**Oral health indicator #8, guided by Healthy People 2020 OH: 7:**

Number of dental patients ages 2 to 17 that had a preventive procedure in a measurement year.

Results of this benchmark showed preventive utilization for this age group increased by 97% (n=2,164 to n=4,271 procedures) from measurement year 1, fiscal year 2007 to 2008 to year 5 fiscal year 2011 to 2012.

Table VIII: Oral Health Indicator #7

Percent and number of services by provider type in a measurement year		
Total number of D-code services performed by each provider/Total number of D-code services		
Fiscal Year	Dental Hygienist/ Total Procedures	Dentist/ Total procedures
2007	2,965/11,470 (26%)	8,505/11,470 (74%)
2008	4,819/13,360 (36%)	8,541/13,360 (64%)
2009	6,608/18,185 (36%)	11,577/18,185 (64%)
2010	8,467/19,007 (45%)	10,540/19,007 (55%)
2011	8,706/19,651 (44%)	10,945/19,651 (56%)

Table IX: Oral Health Indicator #8

Benchmark: Number of preventive services for ages (2 to 17) in a measurement year	
Total number of preventive services for ages (2 to 17)/Total number of preventive services for all age groups	
Fiscal Year	Preventive procedures/total procedures
2007	2,164/3,321 (65%)
2008	2,920/4,522 (64%)
2009	3,926/5,786 (68%)
2010	4,279/6,590 (65%)
2011	4,271/6,146 (69%)

**Oral health indicator #9 endorsed and designed by National Quality Forum #1388:**

Percent of Medicaid patients ages 2 to 21 that had at least 1 dental procedure during a measurement year shows.

This benchmark showed Medicaid patients ages 2 to 21 that had at least 1 dental procedure during a measurement year showed (out of n=30,154 pro-

Table X: Oral Health Indicator #9

Percentage of Medicaid patients (aged 2 to 21) having at least one dental procedure during a measurement year			
Fiscal Year	Medicaid procedures/total Procedures	Uninsured procedures/total procedures	Private Insured procedures/total procedures
2007	3,030/3,827 (79%)	679/3,827 (18%)	118/3,827 (3%)
2008	4,049/5,177 (78%)	831/5,177 (16%)	297/5,177 (6%)
2009	5,178/6,724 (77%)	1,157/6,724 (17%)	389/6,724 (6%)
2010	6,033/7,417 (81%)	1,039/7,417 (14%)	345/7,417 (5%)
2011	5,355/7,009 (76%)	1,080/7,009 (15%)	574/7,009 (8%)

Table XI: Oral Health Indicator #10

Goal: Increase preventive procedures while decreasing restorative and urgent care procedures for the ages (65>) from previous measurement years			
Fiscal Year	Total preventive services for ages (65>)/Total services for age group (65>)	Total restorative services for age group (65>)/Total services for age group (65>)	Total urgent care services for age group (65>)/Total services for age group (65>)
2007	154/611 (25%)	109/611 (18%)	210/611 (36%)
2008	247/734 (33%)	153/734 (21%)	219/734 (30%)
2009	413/895 (46%)	163/895 (18%)	181/895 (20%)
2010	340/794 (43%)	193/794 (24%)	173/794 (22%)
2011	370/858 (43%)	170/858 (20%)	195/858 (23%)

cedures), 78% were Medicaid compared to all other payer types, with 16% were uninsured and 6% were privately insured. Although the percent of Medicaid patients for this age group remained stable over this 5-year measurement period, results revealed 16% of patients in this age group were uninsured.

**Oral health indicator #10 refers to Healthy People 2020 OH: 3.2:** Number of patients ages 65 to 75 with untreated coronal caries in a measurement year. This Iowa’s health center dental management modified this indicator, to increase preventive procedures while decreasing restorative and urgent care procedures for the age group (65>) from previous measurement years.

Figure 2 gives overall 5-year data for age category (65>), showing preventive procedures averaged 39% (n=1,524), restorative 20% (n=788), urgent care 25% (n=978), and other 15% (n=602). The goal to increase preventive procedures while decreasing restorative and urgent care procedures for this age group of (65>) from previous measurement years is being met. Our findings showed, there was an increase of n=216 or 140% for preventive procedures, restorative showed an increase of n=61 or 56%, while urgent care procedures decreased by n=15 or a 7% reduction. Of those visits, 81% were uninsured, 17% Medicaid and 2% privately insured.

Overall, this community health center’s dental department provided 50% of procedures (n=40,723) to Medicaid, 44% (n=36,033) were uninsured and 6% were privately insured patients over the 5-years measured. The racial breakdown showed an average of 75% Caucasian, 13% African American, 7% Hispanics, 2% more than one race and 3% for other. For gender, females received n=44,266 procedures, while males utilized n=37,407.

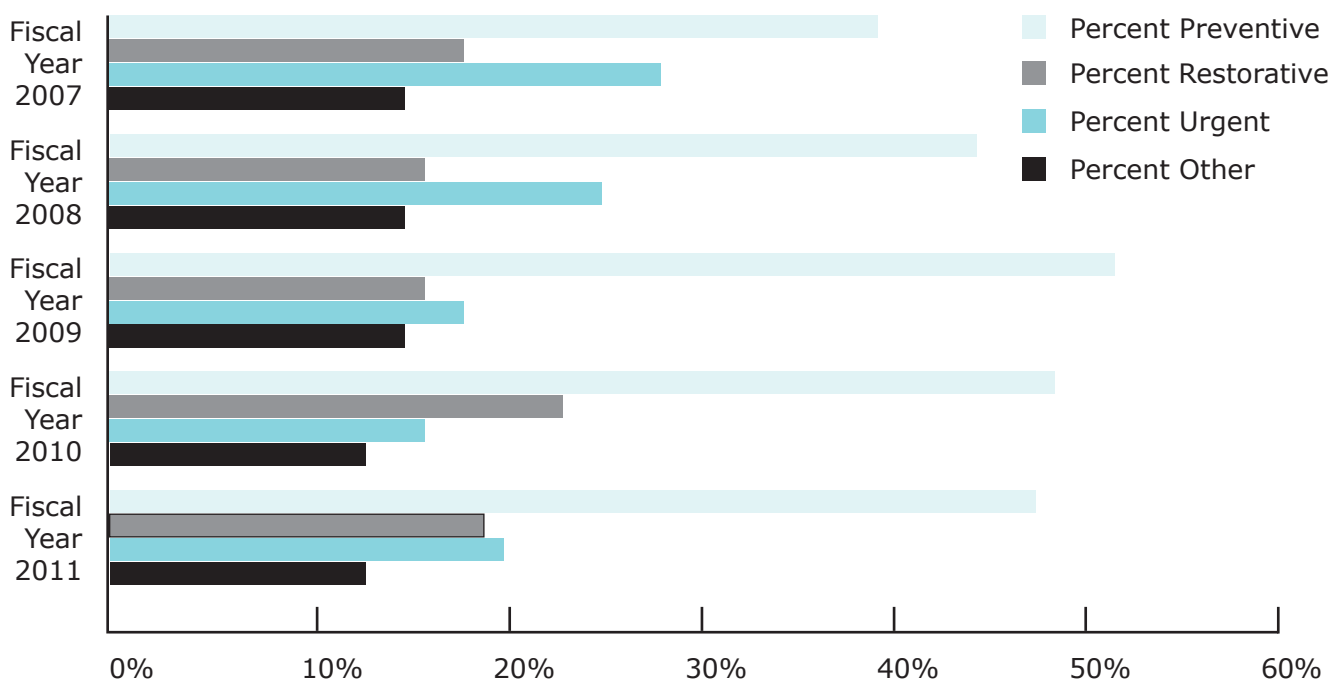
**DISCUSSTON**

Although there is little consensus among dental professionals on which performance measures should be adopted, the oral health indicators chosen for this report expressed the philosophy of the dental management of Crescent Community Health Center. The 10 oral health indicators, established by Healthy People 2020, HRSA, Maternal Health, National Quality Forum, DHHS, and Crescent Community Health Center’s management were chosen based on the commitment these developers have to improving oral health outcomes for vulnerable populations. The objective of collecting data on the 10 measures were to show evidence of provider performance, accountability to stakeholders and provide the benchmarks for quality enhancement and ultimately improve oral health outcomes for at-risk populations.

The data showed there was an increase in number of unduplicated patients (86%), as well as an



Figure 1: Type of Dental Procedures Utilized for Fiscal Year 2007 to 2008 Through Fiscal Year 2011 to 2012



increase of 71% in the number of procedures from fiscal year 2007 to 2008 to fiscal year 2011 to 2012. The dental hygiene department provided significant impact regarding preventive services for oral health performance indicators #2, #3, #5, #6, #7, #8 and #10. Utilization for preventive procedures showed an overall increase of 106%, restorative increased by 87% and urgent care by 26%. Gender and age at the time of service remained stable in relation to procedure type. For payer type, Medicaid utilization declined slightly while the uninsured population grew. This result implies Crescent Community Health Center is reaching the uninsured populations of this community as affordability to oral health care increases access and reduces barriers to services.

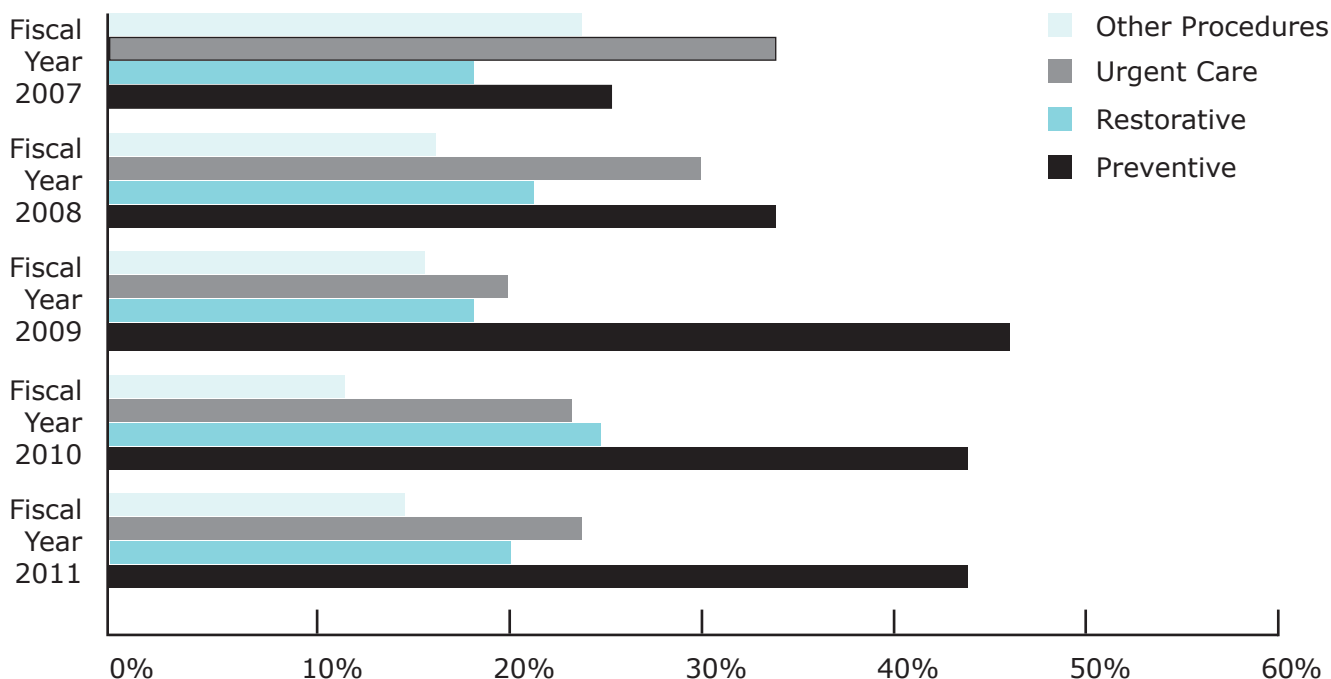
Regarding oral health indicator #3, sealant utilization needs to increase. The Pew Center report, *Falling Short: Most States Lag on Dental Sealants*, provided a strong message that most states are ineffective when it comes to providing sealants to children.<sup>29</sup> Pew data showed out of 50 states, only North Dakota, Maine, and New Hampshire were given an "A" grade for sealant placement. Majority of states received a "C" or lower.<sup>29</sup> While dental hygienists and dentists understand the importance of sealant placement, our data showed a shortfall of sealant utilization for this community health center. These findings suggest the necessity for increased advocacy, diagnoses, treatment planning, and educating parents on the importance of the benefits of timely sealant placement.<sup>30</sup> In a recent New Hampshire study by Chi et al, the proportion of sealant placement compared to

all other procedures averaged 12%.<sup>31</sup> The results of the current study showed only 7% of all procedures were sealants, roughly half found in Chi's study. With approximately 80% of all children under the age of 21 having Medicaid and 10% privately insured, this community health center appears to be falling short when it comes to sealant application.

The goal to reduce the proportion of children (ages 3 to 5) receiving restorative or extraction procedures, while increasing preventive procedures, showed measurable change. Preventive procedures increased by 59% (n=545 to n=865) and restorative procedures increased 56% (n=110 to n=172). Extractions showed the least amount of change at 17% (n=117 to n=137) over the 5 years measured. These findings indicate, by reducing barriers, access to preventive utilization for Medicaid children may replace more invasive procedures.<sup>32</sup> Again, the Crescent Community Health Center dental hygienists' role as a preventive specialist influences the change from extractions to restorative through preventive intervention. Hygienists provide and track oral health education, nutritional guidance, and fluoride placement, leading to improved oral health outcomes for this age group (3 to 5).

Additional research is needed to assess the number of patients who received a comprehensive exam compared to the number of patients completing their treatment in a measurement year (oral health indicator #6, patients age 18>). The prevalence of unmet dental needs is an ongoing problem for low-income

Figure 2: Age Category 65 and Older by Procedure for Fiscal Year 2007 to 2008 Through Fiscal Year 2011 to 2012



populations, placing them at risk of advanced oral health conditions.<sup>33</sup> This dental department needs to use this data to develop a goal to complete treatment plans base on the number of comprehensive exams performed. Developing a plan to track incomplete treatment plans can facilitate better health outcomes for Crescent Community Health Center dental patients.

Most importantly, results of this study revealed the contribution dental hygienists make to this health center, providing close to 40% of all services. Overall, preventive utilization has increased from 39% to 47%, and urgent care utilization showed a slight decline from 15% to 13%. Dental hygienists at this FQHC play a critical role in the success of patient oral health outcomes. The dental hygienist's role in oral health promotion in this clinic encompass a multitude of services: oral cancer screenings, nutritional guidance, blood pressure screenings, smoking cessation, the delivery of periodontal care, and counseling on the connection between oral health and general health for at-risk populations. Evidence shows that dental hygienists play an integral part in the success in meeting the oral health goals set forth in this report.

Identifying uninsured children should be a priority of Crescent Community Health Center. Even though the percent Medicaid patients (ages 2 to 21) receiving at least 1 dental service in a measurement year remained stable, there were 16% of children in this age group who were uninsured. This data should encour-

age this community health center's dental administration to educate and facilitate enrollment of this uninsured child population to an appropriate state children insurance program, as this should translate into increased utilization of all procedure types for this age group.<sup>34</sup>

The combinations of barriers such as poverty, living in a rural community, paucity of providers, provider acceptance, add to oral health inequities.<sup>15,35</sup> This Iowa health center provides a safety-net for both prevention and urgent dental care needs for patients experiencing utilization barriers. Given the number of urgent care visits (n=16,936 over a 5-year period), this data provides a critical tool to support the premise this Iowa community health center's provision of care may affect local hospital emergency departments.<sup>36</sup> The goal for Crescent Community Health Centers is to provide continued access to oral care by reducing barriers that prevent equity in oral health for people of low socioeconomic status, thus reducing the need for emergency department visits.<sup>36</sup>

### Limitations

The limitations of this report lay in the lack of standardization of oral health measures among federally qualified health centers with a dental component. Without integration of oral health measures among health centers, there is no mode to compare discrete measures with other dental departments. Outcome measures evaluated here are not meant to be generalizable to private practice settings but to be used to

improve Iowa community health centers dental programs. The strength of this data is that it provides other centers with the model to compare and design measures significant and meaningful to their dental population.

## CONCLUSION

Providing baseline data is instrumental in analyzing deficiencies as well as successes. These oral health indicator measures created a jumping off point for this Iowa health center and provided a model for other dental departments of federally qualified health centers to adopt. Outcome measures provide the tools to create and secure grants for dental programs; they show trends and benchmarks for establishing future goals that improve oral health outcomes for the patients we serve. Baseline measures are a tool, which can promote efficiency in planning for future years. They provide critical data for policy change. Measures promote collaboration between community health centers and lastly provide evidence to our community, stakeholders, professional colleagues, and local business leaders

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the benefits of having a community health center with a dental component in their community.

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# RUNNER-UP: BEST PAPER AWARD

## Evaluating the Impact of Expanded Practice Dental Hygienists in Oregon: An Outcomes Assessment

Kathryn P. Bell, RDH, MS; Amy E. Coplen, RDH, MS

The Journal of Dental Hygiene Best Paper Award was created to recognize the most outstanding research paper published from the previous year (2015). All original research papers published in 2015 were evaluated by a panel of judges, using specific criteria, to make the final selection. This manuscript first appeared in Volume 89, Issue Number 1 of the February 2015 issue of the Journal of Dental Hygiene.

### Abstract

**Purpose:** Currently the dental hygiene practice model in Oregon includes the Expanded Practice Dental Hygienist (EPDH), which allows dental hygienists with an Expanded Practice Permit (EPP) to provide care to limited access populations without the supervision of a dentist. The number and types of services provided by EPDH practitioners is thus far undocumented. The purpose of this study is to conduct an outcomes assessment of EPDH practitioners in order to quantify the impact, defined by count of services, on the access to care crisis in Oregon.

**Methods:** A 16 question confidential survey was developed and approved by the Pacific University institutional review board. The mail-based survey was sent to 181 EPDHs in Oregon in November 2011 (all EPDHs except pilot testers and one author). A second mailing was sent to non-respondents. Data were analyzed using descriptive statistics and chi-square analysis in SPSS.

**Results:** The response rate was 39% (n=71). Approximately 41% (n=29) of the respondents were currently using their EPP to provide care to limited access patients with an additional 21% (n=15) planning to start their own expanded practice. The majority of practicing EPDHs provide care in residential care facilities (n=21) and in school settings (n=13). Of the current practicing EPP holders, 76% practice  $\leq 10$  hours per week, and 66% make  $< \$10,000$  per year. Total services reported in an average month from all responding EPDH practitioners were: 254 adult prophylaxes, 1,003 child prophylaxes, 106 adult fluorides, 901 child fluorides and 1,994 fluoride varnishes, among many other preventive procedures.

**Conclusion:** To a limited extent, the amount and type of services provided by EPDHs has now been quantified, and EPDHs are making an impact on the access to care crisis in Oregon. Continued outcomes assessment is needed to further quantify the impact of EPDHs.

**Keywords:** dental hygienists, professional practice, outcome assessment, health services accessibility  
This study supports the NDHRA priority area, **Health Services Research:** Investigate how alternative models of dental hygiene care delivery can reduce health care inequities.

### INTRODUCTION

Lack of access to dental care has become a public health focus over the past several years in the U.S. and has led to much discussion and change in the profession of dental hygiene.<sup>1</sup> The past 20 years have seen an increase in the amount of decision-making responsibility of the dental hygienist, a reduction in the level of required supervision, and an increase in independent practice among dental hygienists.<sup>2-4</sup> The independent practice of dental hygienists and the mid-level dental provider are concepts that have gained momentum in an attempt to alleviate disparities in access to dental care. The most recent U.S. Department of Health and Human Services report states that there are 4,585 dental health professional shortage areas in which 45 million

people live.<sup>5</sup> The utilization of dental hygienists working in independent practice is a logical approach to help alleviate this access to care challenge.

As of 2012, 35 states allow dental hygienists to provide patient care in a setting outside of a dental office and without a dentist present.<sup>6</sup> Alaska and Minnesota both license mid-level providers, who are allowed to provide basic restorative treatment in addition to the catalogue of typical dental hygiene services, also without the supervision of a dentist.<sup>6</sup> Mid-level dental providers have been recognized internationally for many years,<sup>2</sup> and 5 states are currently forwarding legislation to create dental hygiene based mid-level provid-

er licensure (Vermont, Kansas, Washington, Connecticut and Maine).<sup>6</sup>

Currently, Oregon does not license or employ a mid-level dental provider. However, Oregon is one state in which dental hygienists are allowed to practice without the supervision of a dentist. Expanded Practice Permit Dental Hygienists (EPDHs) (previously known as Limited Access Permit (LAP) dental hygienists) are allowed to render most services within the typical dental hygiene scope of practice without the supervision of a dentist, in specified settings or for populations who experience lack of access to care (defined in ORS 680.205). EPDHs are required to refer patients to a dentist at least once annually for examination and treatment of active dental disease. An EPDH also has the ability to administer local anesthesia, place temporary restorations and prescribe prophylactic antibiotics and non-steroidal anti-inflammatory drugs, but must have a collaborative agreement with an Oregon-licensed dentist.<sup>7</sup> There are 2 pathways through which one may qualify for the expanded practice permit (EPP), which is the permit required to become an EPDH. The first pathway requires 2,500 hours of supervised clinical dental hygiene practice, as well as 40 hours of CE courses in either clinical dental hygiene or public health earned since licensure. The second pathway requires 500 hours of clinical practice (either before or after graduation from a dental hygiene program) working with patients defined in ORS 680.205, while under the direct supervision of faculty members of accredited dental or dental hygiene programs.<sup>8</sup> Despite the need for expanded access to care in Oregon and other states, support for the expansion of the dental hygiene scope of practice and the evolution of the mid-level provider has been mixed among dental hygienists and dentists.<sup>9-12</sup> One question central to the debate of independent practice in dental hygiene and the advancement of a mid-level provider is the question of need: is there a need to have dental hygienists practicing independently? In other words, what is the actual impact of dental hygienists in independent practice on access to care?

In 2008, Battrell et al conducted a qualitative study to analyze the impact of the LAP legislation in Oregon and to determine the nature of the relationships of dental hygienists and dentists who participated in the model. In addition to providing the history of the development of the LAP model, authors presented results of interviews with participating dentists and dental hygienists. Authors concluded that entrepreneur-

ship, lifelong learning and a commitment to underserved populations were common motivations among study participants and that the relationships between the dental hygienists and dentists were positive. At the time of the study, there were 71 licensed LAP dental hygienists. Authors noted that while the number of licensed practitioners was relatively small, there were a growing number of individuals interested in pursuing this practice modality. This finding has proven true, as the number of practitioners has since more than doubled (at the time of the current study, there were 186 dental hygienists who held an EPP). Authors determined that at the time of the study, there was not enough information to draw conclusions regarding the impact of LAP dental hygienists, and that an appropriate next step was evaluation of outcomes. As a qualitative study, this information provides a foundation for the continued assessment of this practice model, what is now the EPDH.<sup>13</sup>

While some form of unsupervised practice has existed since 1997, the settings and services provided by EPDHs have not been measured. The purpose of this study was to conduct an outcomes assessment of EPDH permit holders to assess the extent to which they are utilizing their permit, the scope of the services they are providing, and the number of patients who are being served.

## METHODS AND MATERIALS

A cross-sectional survey of EPDHs was conducted in November 2011. The survey instrument was developed by the authors. The survey instrument and study protocol were reviewed by the Pacific University institutional review board, and the study was approved as exempt. A list of all EPDHs was obtained from the Oregon Board of Dentistry (n=186). A convenience sample of 2% was selected to pilot test the survey instrument. Improvements were made according to feedback from the pilot testers. Surveys were mailed to all EPDHs, with the exception of those who completed the pilot testing, and one of the authors who holds an EPP (n=181). The 16 item survey contained both closed and open-ended questions, as well as one Likert-scale question, that assessed the following areas: demographics, income from EPDH practice, amount and types of services provided, details of EPDH practice, and perceived barriers to practicing as an EPDH. This article focuses on the outcomes assessment sections. Perceived barriers to utilizing an EPP will be addressed in a separate report.

The survey tool was distributed via mail along

Table I: Demographics of Responding EPDHs

	Number of Respondents	Category	n	Percent
Age by Category	70	20 to 30	6	9%
		31 to 40	10	14%
		41 to 50	15	21%
		>50	39	56%
Years held EPP	66	0 to 3	41	62%
		4 to 6	9	14%
		7 to 9	5	8%
		≥10	11	17%
Practicing using EPP	71	41%	-	-
Mean Hours Per Week using EPP	25	9.3 (Std. Dev. 12.47)	-	-
Income from EPP	27	≤10,000	18	67%
		10,001 to 20,000	4	15%
		20,001 to 30,000	3	11%
		30,001 to 40,000	1	4%
		40,001 to 50,000	0	0%
		>50,000	1	4%
Level of Education	67	Certificate	2	3%
		Associate	22	33%
		Bachelors	39	58%
		Masters	4	6%

\*Not every respondent answered every question. The number of respondents who answered each question is indicated in the second column. The percentages may not total to 100% due to rounding.

with a cover letter explaining the purpose of the study and consent was implied by returning the survey. The first mailing was conducted in early November 2011, with the second mailing following after 3 weeks. To maintain confidentiality, the surveys were numerically coded, and the principal investigators were the only people with access to the coding file. The coding file was maintained solely to facilitate the second mailing (a second survey was only sent to non-respondents 3 weeks following the initial mailing). Once data collection was completed, the coding file was destroyed. Data entry was completed manually by the principal investigators. For open-ended questions, answers were categorized by each author independently and then reviewed. Any discrepancies in categorization were discussed and adjusted, with both authors in agreement regarding the classification. If at least 3 respondents provided similar responses, an additional category was created. If a response was reported in less than 3 instances, it was categorized as "other." Statistical analysis was completed using SPSS version 20 (IBM) and included descriptive statistics and chi-square analyses. Chi-square analysis using the Freeman-Halton extension of the Fisher exact test was used to determine if statistically significant differences existed among those respondents who reported practicing utilizing the EPP and those who did not, particularly

Table II: Qualifying Populations under ORS 680.205 for Which Responding EP-DHS Provide Care (n=30)

Population Treated by Practicing EPDHs	n
Residential Care Facilities	21
Primary and Secondary Schools	13
Homebound Adults	5
Populations deemed "limited Access" by dental board	5
Community Health Clinics	4
Nursing Homes	3
Foster Homes	2
Age (due to age are unable to receive regular dental hygiene treatment)	1
Correctional Facilities	1
Youth Centers	1
Nursery Schools or Daycares	1
Mental Health Residential Programs	0
Facilities for mentally ill patients or persons with mental retardation	0
Infirmity or disability	0

\*Total number greater than number of practicing EP-DHS because respondents could provide more than one response.

Figure 1: Average Annual Income from Practice Using EPP (n=27)

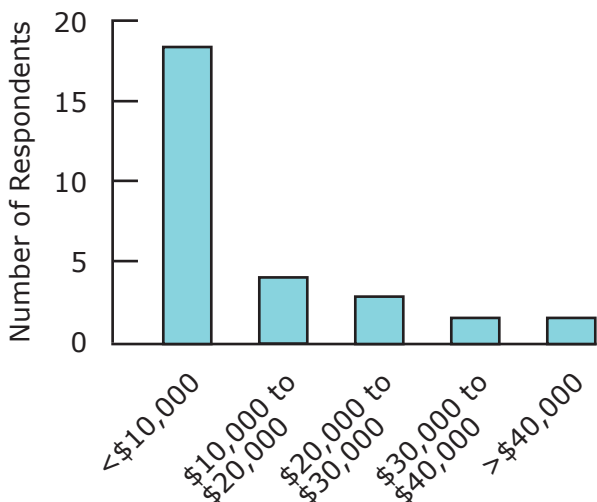


Figure 2: Rate of Reimbursement from Third Party Payers for Services Provided by EPDH (n=23)

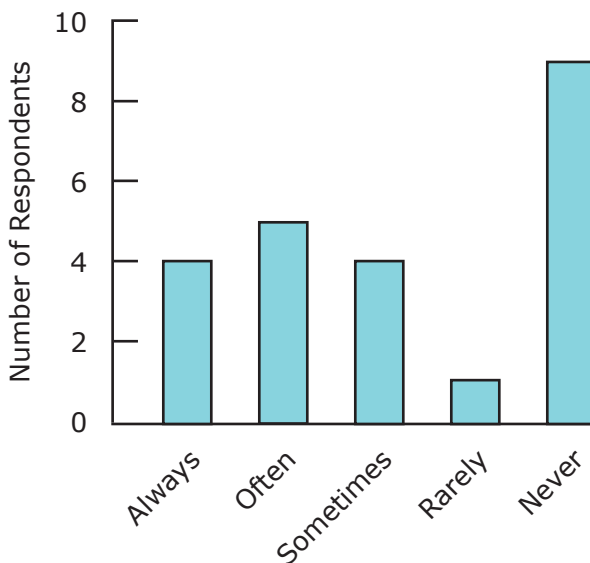


Table III: Total Number of Services Provided as Reported by Responding EPDHs (Time Period of 1 Month)

Procedure	Procedure Code	Number Provided
Adult Prophylaxis	D1110	254
Child Prophylaxis	D1120	1003
Adult Fluoride	D1204	106
Child Fluoride	D1203	901
Fluoride Varnish	D1206	1994
Scaling and Root Planing (SRP) $\geq 4$ teeth/quadrant	D4341	56
SRP 1-3 Teeth/quadrant	D4342	24
Periodontal Maintenance	D4910	83
Full Mouth Debridement	D4355	45
Full Mouth Series of Radiographs (FMX)	D0210	3
4 Bitewing Radiographs (BWX)	D0274	0
2BWX	D0272	0
Panoramic Radiograph (Pano)	D0330	0
Sealants	D1351	885
Soft Denture Reline	D5730, D5731, D5740, D5741	19
Oral Hygiene Instruction (OHI)	D1330	1744
Comprehensive Periodontal Examination	D0180	162

in regards to practitioner age, number of years since graduation, type of dental hygiene degree, and length of time holding the EPP. The level of significance was set at 0.05.

## RESULTS

Responses were collected from 71 EPDHs, yielding a 39% response rate. The majority of responding EPDHs (56%, n=39) are 51 years of



Table IV: Average Number of Services Provided Per Month as Reported by Individual Responding EPDHs

Procedure	Mean (Standard Deviation)	Maximum
Adult Prophylaxis (n=25)	7.72 (11.2)	50
Child Prophylaxis (n=26)	37.00 (116.2)	500
Adult Fluoride Treatment (n=25)	2.8 (6.4)	30
Child Fluoride Treatment (n=25)	28.2 (106.1)	500
Fluoride Varnish (n=25)	75 (206.8)	1000
Scaling and Root Planing >4 teeth per quadrant (n=25)	1.3 (3.6)	15
Scaling and Root Planing 1 to 3 teeth per quadrant (n=25)	0.7 (2.1)	10
Full Mouth Debridement (n=25)	1.3 (4.1)	10
FMX (n=25)	0.1 (0.4)	2
4 BWX (n=25)	0 (0)	0
2 BWX (n=25)	0 (0)	0
Panoramic Radiograph (n=25)	0 (0)	0
Periapical Radiograph (n=25)	0.9 (4.0)	20
Sealant (n=25)	35.4 (103.4)	500
Soft Denture Reline (n=24)	0.1 (0.4)	2
Oral Hygiene Instruction (n=26)	60.2 (121.8)	500
Comprehensive Periodontal Examination (n=25)	5.0 (10.1)	50

age or older, and most (66%, n=41) have held their EPP for 3 years or less. Respondent demographics are presented in Table I. Forty-one percent (n=29) of respondents report that they are currently practicing using their EPP. An additional 20% (n=15) indicated that they had plans to begin using their EPP in the future. The mean number of hours per week spent practicing using the EPP was 9.3 (SD=12.47). Respondents who were currently practicing utilizing their EPP were asked to indicate in what manner their patient population qualified under ORS 680.205 as having limited access to care. The most frequently identified populations were patients in residential care facilities (n=21) and primary and secondary schools (n=13). A complete listing of participants' qualifying patient populations is presented in Table II.

Sixty-six percent (n=18) of practicing EPDHs reported making less than \$10,000 per year from their EPP practice (Figure 1). The majority of practicing EPDHs (70%, n=19) own and use portable equipment. Forty-one percent (n=12) of practicing EPDHs advertise for their services, and 36% (n=10) have reported difficulty in obtaining needed supplies.

Table V: Reported Hours per Week Spent in EPDH Practice

Hours per Week in EPDH Practice	Respondents (n=25)	
	n	Percent
≤5	12	48
6 to 10	7	28
11 to 20	2	8
21 to 30	0	0
31 to 40	4	16
>40	0	0

Respondents who were currently practicing using the EPP were asked to indicate how often they had been successful in obtaining reimbursement from Oregon Health Plan (OHP) or other insurance plans. Thirty-nine percent (n=9) of those who answered responded that they had never been successful (Figure 2). Respondents were also asked to indicate the number of services they provided in an average month in their role as an EPDH. Child prophylaxes, child fluoride, fluoride varnish and sealants were the most frequently reported services among practicing EPDHs. The sum total of average monthly services provided

by all respondents is presented in Table III. The average number of services provided per month by individual responding EPDHs is presented in Table IV. Most practicing EPDHs reported working  $\leq 10$  hours per week. Table V displays the average number of hours per week worked as reported by practicing EPDHs. The largest proportion of practicing EPDHs who answered the question (48%,  $n=12$ ) indicated that they worked  $\leq 5$  hours per week, followed by 28% ( $n=7$ ) who indicated that they worked 6 to 10 hours per week.

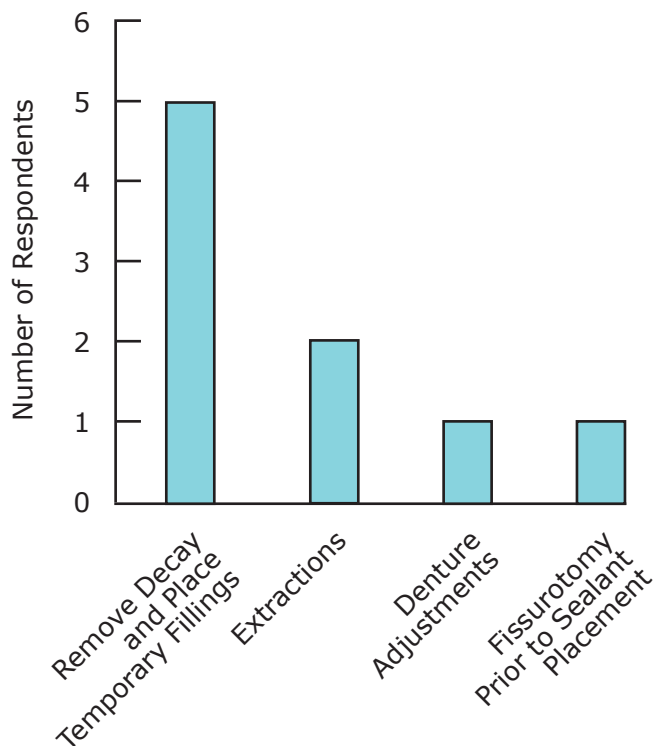
One of the open-ended survey questions asked practicing EPDHs to report the most commonly seen oral care needs that they were unable to meet, but would be able to meet if the scope of practice were expanded. Responses included temporary restorations, extractions (adult and pediatric), fissurotomy prior to sealants, and denture adjustments (Figure 3).

Bivariate analysis using the Chi-square test with the Freeman-Halton extension of the Fisher exact test was conducted to see if there were any statistically significant differences among those currently practicing using an EPP and those who were not. Areas analyzed included age, number of years since graduation, education level and number of years holding the EPP. No statistically significant differences were found.

### DISCUSSION

This is the first time that the amount of services provided by the EPDH workforce in Oregon has been quantified. The most frequently identified patient population served was “residential care facilities” with primary and secondary schools following behind it. Despite this result, child prophylaxis (D1120), child fluoride (D1203), fluoride varnish (D1206) and sealants (D1351) were the most numerous of the reported services, with relatively lower numbers of adult prophylaxes (D1110) and quadrants of scaling and root planing reported. These findings suggest that Oregon EPDHs have the most success providing care for pediatric patients. The apparent discrepancy between the most frequently served population (residential care facilities) and the most frequently provided services may be due to the nature of the survey questions. The question regarding patient populations was open ended, so the results lack some definition in this area. For example, were the reported “residential facilities” those in which pediatric patients reside, for the elderly or infirm, for patients with mental or physical disabilities, or a combination of all of these? Or is it perhaps that treating children in

Figure 3: Reported Additional Patient Care Needs Outside of EPDH Scope of Practice ( $n=9$ )



schools simply provides EPDHs with large numbers of patients resulting in relatively large numbers of these types of services? Is it easier for practicing EPDHs to get established working in the school system than it is to obtain the acceptance and cooperation needed to work in medical or other facilities? Is it potentially easier to be reimbursed for pediatric services? Due to this uncertainty, it appears that the most reliable measure of impact is the type of service provided, not the population served.

The prevalence of pediatric services in the results of this study represents a potential departure from the existing literature. Kushman et al conducted a study to evaluate practice characteristics of independently practicing dental hygienists in California who were participating in the California Health Manpower Pilot Project 139 (HMPP 139) which ran from 1987 to 1990. Their results indicated that the practices were primarily centered on preventive care measures (prophylaxes, fluoride applications, sealants and exams), but authors did not delineate between pediatric and adult services.<sup>14</sup> Astroth and Cross-Poline reported that among dental hygienists in independent practice in Colorado, more preventive services were provided for adults than for pediatric patients.<sup>15</sup> The independent practice models in Colorado and in California under the HMPP 139

differ from the Oregon practice model in that Oregon's model limits the settings and populations that may be served. This may account for the differences seen in the types of care provided. The California HMPP 139 facilitated an experimental environment in which independent practice dental hygiene could be evaluated. Dental hygienists were permitted to set up businesses to provide dental hygiene care independently, and could provide all services allowed under general supervision. No stipulations were made about populations that could receive care.<sup>16</sup> In Colorado, dental hygienists are permitted to practice independently as well as own and operate their own business or practice.<sup>15</sup>

The practice act in Oregon permits EPDHs to serve many populations that have been deemed "underserved." As presented in Table II, there are many populations that EPDHs are permitted to serve, but no respondents indicated that they work with these communities (e.g., patients with mental illness or in clinics operated or staffed by nurse practitioners, physician assistants, or midwives). This may indicate that barriers exist in gaining access to these types of clinics, or that current permit holders are unaware that some of these populations qualify to be served by EPDHs. Even though significant services are being provided by Oregon EPDHs, the current findings indicate that current EPP-holders in Oregon may not be practicing to the full extent of their permitted abilities, which potentially lessens their impact.

There is considerable room for growth for independent practice in dental hygiene in Oregon. Coplen and Bell investigated perceived barriers to pursuing independent practice among EPDHs in Oregon.<sup>17</sup> With the majority of practicing EPDHs indicating that they work less than 10 hours per week, many more individuals could be served if EPDHs practiced in this manner full time. Many of the respondents hold an EPP but do not utilize it to practice in this realm. Permit holders face several barriers, and among non-practicing EPDHs, the most commonly reported reasons for not pursuing EPDH practice were "currently working in a different setting" and "lack of business knowledge." Insurance reimbursement and inability to make a living wage were two of the reported barriers among practicing and non-practicing EPDHs, and likely also contribute to this low utilization of the EPP.<sup>17</sup> To clarify, if EPDHs are unable to attain reimbursement from third party payers, patients typically pay for services out of pocket. Since the completion of this study, new legisla-

tion passed in Oregon that requires any services that would be paid to a dentist through insurance plans must also be paid to an EPDH providing the same services. This has the potential to increase the ability of EPDHs to make a living wage. In addition, practicing EPDHs cited difficulty in obtaining a collaborative agreement or cooperative facility in which to practice.<sup>17</sup> Some practicing EPDHs report difficulty obtaining supplies. This difficulty comes from several areas: some items (for example an emergency medical kit) require a DEA number to be purchased (this is a number assigned to medical providers by the Drug Enforcement Administration that is required for prescription writing), some vendors are reluctant to sell to people who are not an established dental office and some items are prohibitively expensive if they are not purchased in bulk (however, if they are purchased in too large a quantity, they expire before they can be used). To address this last difficulty, some EPDHs will place orders as a group, and then subdivide the bulk items.

Coordinated Care Organizations (CCOs) are a relatively new addition to the health care system in Oregon. In June 2011, House Bill 3650 was signed into law, creating the framework for a state-wide system of health care networks that cover patients under the OHP which is the state Medicaid plan. CCOs are designed to address physical, mental and dental health with the intent that patients will have a better safety net to help ensure better overall health outcomes.<sup>18</sup> The full implementation of dental care organizations into the CCO framework has yet to occur. Once dental care is fully integrated into CCOs, it may be easier for EPDHs to work in a full time capacity and in different settings since dental care is required within the CCOs. It seems that an EPDH would be a logical fit for this new health care model. Hypothetically, the integration of EPDHs into these organizations would spread the dental safety net even farther.

The question of the need for a mid-level provider in Oregon cannot adequately be addressed by this survey alone. One may argue that while EPDHs are providing services to many people, there are still many more patients in need of care, particularly restorative care, which could be provided by a mid-level dental provider. Oregon is currently undergoing a shift in its health care system as CCOs are being integrated, with the full implementation of dental care yet to come. Currently there are 15 CCOs operating in Oregon.<sup>18</sup> Would a mid-level dental provider be more effective in filling the access to care gap that

exists in Oregon, particularly if they were easily integrated into CCOs? The addition of basic restorative services to the traditional catalogue of dental hygiene services would allow for more dental needs to be met. If a mid-level provider model became the most effective way to provide dental care through CCOs in Oregon, EPDHs may no longer be necessary. However, the ease of integration of a mid-level provider into CCOs, or even in independent practice in Oregon, may be difficult to foresee at this point in time. With the implementation of the health insurance exchanges of the Affordable Care Act (ACA), this question may remain difficult to answer. The ACA requires each state to establish a health insurance "marketplace" or "exchange," which is an online marketplace where individuals can purchase health insurance. Participating insurance coverage providers will make their plans available on the exchanges for public consumption.<sup>19</sup> As the dental insurance plans are made available through the exchanges, the dental coverage playing field will shift, and it is likely that there will be changes in the number of patients who are served by OHP. There may be a change in the number of children who are eligible for guaranteed dental services. Adult dental care is not included in Oregon's Essential Health Benefits benchmark plan,<sup>20</sup> therefore adults who qualify for Medicaid and others with lower incomes will still face financial difficulties in obtaining dental health care. It may be difficult to determine whether there is a need for a mid-level dental provider until the implementation of the ACA has happened and CCOs are well established. The effect of the ACA on the success of EPDHs will remain unknown until implementation has occurred.

Some limitations were inherent in the current study. The response rate was lower than anticipated, but respectable when compared to typical response rates of mail-based surveys (26 to 49%).<sup>21</sup> Due to the response rate, results may not be generalizable to the entire population of EPDHs, but only to the participants. A larger response rate would have provided more information and improved generalizability. While the survey contained questions specifically designed for EPDHs who were not currently practicing in that role, authors believe that recipients who weren't currently using their EPP may not have declined because they thought the survey did not apply. If these recipients did not read far enough through the survey, they would not have seen the directions to skip the bulk of the survey and answer only a few questions. Clearer instructions in the cover letter may have proven beneficial in

increasing the response rate. Another limitation was found with the question regarding whether or not the permit holder was currently practicing using the permit. The only options included in the survey instrument were "yes" and "no," and there was no follow up to ask if the participant had plans to begin using it in the future. Several respondents indicated in the open response section at the end of the survey that even though they were not currently using their EPP, they had plans to do so. Had an option been included to capture this subset, authors may have a better idea of anticipated future usage rates. A third limitation to this study was that authors were not able to establish survey performance reliability. The survey has been administered only one time, so test-retest reliability could not be determined. In order to keep the survey to a minimal length, no redundant questions were included to evaluate internal reliability. To facilitate data entry and consistency of information, every survey mailed was identical, so no alternate-form reliability was established.

Plans for future research include continued outcomes assessment of EPDHs to monitor the amount of services that are being provided. In addition, authors plan to poll program directors in states that allow independent practice to determine whether or not programs include specific curricular innovations to help prepare students for independent practice.

## CONCLUSION

To a limited extent, the services provided by EPDHs have now been quantified. While less than half of respondents indicated that they were currently practicing using the EPP, practicing EPDHs reported providing significant numbers of services to underserved populations in Oregon, which demonstrates that the provider model is effective. Most of the services provided were pediatric services, which indicates that EPDHs have had the most success in accessing and serving this group of patients. However, there is considerable room for growth as demonstrated by the low number of average hours worked per week by EPDHs. In addition, there are as yet many eligible populations who are not routinely being served by EPDHs. Continual outcomes assessment is needed to determine future need for independent practice dental hygienists and the need for the implementation of mid-level dental providers in Oregon, specifically after the full implementation of CCOs and the ACA.

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# THIRD PLACE: BEST PAPER AWARD

## Assessing Evidence-Based Practice Knowledge, Attitudes, Access and Confidence Among Dental Hygiene Educators

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The Journal of Dental Hygiene Best Paper Award was created to recognize the most outstanding research paper published from the previous year (2015). All original research papers published in 2015 were evaluated by a panel of judges, using specific criteria, to make the final selection. Below is a reprinting of the abstract of the third place recipient. This manuscript first appeared in Volume 89, Issue Number 5 of the October 2015 issue of the Journal of Dental Hygiene.

### Abstract

**Purpose:** To assess U.S. dental hygiene educators' evidence-based practice (EBP) knowledge, attitude, access and confidence and determine whether a correlation exists between assessment scores and level of education, length teaching and teaching setting (didactic, clinical or both).

**Methods:** A cross-sectional survey was conducted with a sample of dental hygiene faculty from all 334 U.S. dental hygiene schools. ANOVA and Pearson correlation coefficient statistical analysis were utilized to investigate relationships between demographic variables and application of evidence-based principles of patient care.

**Results:** This study involved a non-probability sample (n=124), since the total faculty among all U.S. dental hygiene schools was not determined. Analysis demonstrated a positive correlation between EBP knowledge, access and confidence scores indicating that as knowledge scores increased, so did confidence and access scores ( $r=0.313$ ,  $p<0.01$  and  $r=0.189$ ,  $p<0.05$ , respectively). Study findings also revealed that faculty who held advanced educational degrees scored significantly higher in EBP knowledge ( $F_{3,120}=2.81$ ,  $p<0.04$ ) and confidence ( $F_{3,120}=7.26$ ,  $p<0.00$ ).

**Conclusion:** This study suggests the level of EBP knowledge, attitude, access and confidence increases with additional education. Therefore, more EBP training may be necessary for faculty who do not possess advanced education. Results of the study indicate that further incorporation of EBP into dental hygiene curricula may occur as dental hygiene educators' knowledge of EBP increases, which in turn could enhance students' acquisition of EBP skills and their application of EBP principles toward patient care.

**Keywords:** evidence-based practice, evidence-based dentistry, dental hygiene, dental education

This study supports the NDHRA priority area, **Professional Education and Development:** Investigate the extent to which new research findings are incorporated into the dental hygiene curriculum.

# NATIONAL DENTAL HYGIENE RESEARCH AGENDA

The goal of the revised National Dental Hygiene Research Agenda is to lead the transformation of the dental hygiene profession to improve the public's oral and overall health. The revised research agenda is intended to guide researchers, educators, clinicians and students who seek to support ADHA priorities for advancing the profession through research and the generation of new knowledge within the discipline of dental hygiene. The model provides novice investigators, especially students, as well as junior and experienced researchers, with a visual framework for conceptualizing how their research topic addresses identified priorities. Additionally, this revision prepares the profession to evolve by acknowledging that dental hygiene research is necessary for advancing the profession and improving the health of the public.

The revised research agenda was led by the ADHA 2014-2016 Council on Research, in collaboration with ADHA staff. The members of the Council on Research are:

Deborah M. Lyle, RDH, BS, MS, New Jersey, Chair; Ashley Grill, RDH, BSDH, MPH, New York; Jodi Olmsted, RDH, PhD, Wisconsin; Marilynn Rothen, RDH, MS, Washington.

## INTRODUCTION

A profession involves the acquisition of knowledge and skills in a unique area through formal training. A discipline is a branch of knowledge studied and expanded through higher education and research, while a profession consists of persons educated in the discipline according to nationally regulated, defined and monitored standards.<sup>1</sup> The regulation of a profession and establishment of clinical standards are important aspects of the social contract between a profession and the society it serves.

The American Dental Hygienists' Association (ADHA) acknowledges the importance of a body of research unique to dental hygiene in defining it as a profession and developing it into a discipline. The aim of the dental hygiene research agenda is to provide a framework to guide those members of the profession who desire to add to the body of knowledge that defines the dental hygiene profession. In recognition of the importance of relevancy of the NDHRA to the dental hygiene profession, ADHA is committed to the ongoing updating of the NDHRA as the dental hygiene body of knowledge expands

ADHA defines the discipline of dental hygiene as the art and science of preventive oral health care including the management of behaviors to prevent oral disease and promote health.<sup>2</sup> The ADHA research agenda proposes to continue to develop and add to the body of knowledge that defines the profession. As research builds the discipline of dental hygiene, the profession demonstrates its value to society through the

provision of service and care, and ultimately, improved oral health.

Historically, dental hygiene has drawn in part on other disciplines, such as the disciplines of periodontics and public health, for the evidence used to support its own practice and education. The generation of scientific knowledge and utilization of an interdisciplinary approach to knowledge benefits the profession through shared initiatives and perspectives. The goal of increasing dental hygienists' participation in research is to grow beyond reliance on research originating from other disciplines and, instead, build upon existing research so the knowledge base can emerge from within dental hygiene itself.<sup>3</sup> To this end, the framework of the dental hygiene research agenda directs dental hygiene researchers to contribute knowledge that is unique to dental hygiene. The 5 primary objectives that were the basis for the creation of the National Dental Hygiene Research Agenda still remain applicable today:<sup>4</sup>

1. To give visibility to research activities that enhance the profession's ability to promote the health and well-being of the public;
2. To enhance research collaboration among members of the dental hygiene community and other professional communities;
3. To communicate research priorities to legislative and policy-making bodies;
4. To stimulate progress toward meeting national health objectives; and
5. To translate the outcomes of basic science

and applied research into theoretical frameworks to form the basis for dental hygiene education and practice.

The updated research agenda visually illustrates how the areas of dental hygiene research move through discovery, testing and translation into education and practice. Discovery is the phase of research where ideas are generated, testing is where concepts and interventions are implemented and outcomes are generated and evaluated, and translation disseminates findings to the profession and to the scientific community at large.

Translational research aims to “translate” findings from basic science research into interprofessional medical, nursing and dental practice for improving health outcomes. Decisions for practice or subsequent research are based on all phases: discovery, testing and translation. For example, the discovery phase of research might document barriers, while the testing phase considers assessing interventions and improving application of science to practice. Within the translation level of research, the process of translating or moving findings from research into practice is examined. It verifies that the application of these findings results in improved health for clients and populations. Research hypothesis need to be tested and then applied (translated) in real life settings with outcomes measured and assessed.

Using the three phases of research changes the way we conceptualize the dental hygiene research agenda from a linear design with a list of objectives to a visual display showing the inter-relationship existing between the phases of research and themes or areas of research. The new visual display was designed recognizing that all research is interconnected and multifactorial, while also recognizing that results can influence future need for additional research.

## PERSPECTIVES ON THE ADHA RESEARCH AGENDA

Dental hygiene and research have been linked since the early 1900s. In 1914, Dr. Fones’ 5-year study in public schools demonstrated that dental hygienists can positively impact oral disease using education and preventive methods.<sup>5</sup> Dental hygienists today are increasingly becoming involved in research at all levels and are helping to provide data that will impact the profession for years to come.

The first ADHA National Dental Hygiene Research Agenda (NDHRA) was developed in 1993 by the ADHA Council on Research and adopted by the ADHA House of Delegates in 1994.<sup>4</sup> A Delphi study was used to establish consensus and focus the research topics for the agenda.<sup>6</sup> This was the first step to guide research efforts that support the ADHA strategic plan and goals. A research agenda provides direction for the development of a unique body of knowledge that is the foundation of any health care discipline and, as such, should be used to drive the activities of the profession.

In 2001, the Council on Research revised the agenda to reflect a changing environment based on two national reports: The Surgeon General’s Report on Oral Health and Healthy People 2010. Input from the 2000 National Dental Hygiene Research Conference sponsored by ADHA was considered in the revision. The revised document was released in October 2001 and prioritized the key areas of research.<sup>7</sup>

In 2007, the agenda was revised to reflect current research priorities aimed at meeting national health objectives and to systematically advance dental hygiene’s unique body of knowledge. These revisions were based on a Delphi study that was conducted to gain consensus on research priorities.<sup>8</sup>

A goal of the present (2016) revision is to allow greater usability of the agenda across the profession and interprofessionally. The cohesive, coherent visual illustration that constitutes this revision might assist educators in disseminating research concepts to students. By showing the relationships among the priorities, the themes and the research process, the Council on Research hopes to improve understanding of how dental hygienists can use the research agenda. Research is an ongoing process. Contributions can be made to it, and priorities can be revised, at any phase in the model, from discovery through testing, evaluation, dissemination and translation.

In this revision, the Council on Research has integrated feedback on the revised presentation of the agenda received from research meetings with representatives of the International Federation of Dental Hygiene, the Canadian Dental Hygienists Association and The National Center for Dental Hygiene Research and Practice. Feedback from graduate dental hygiene program directors and dental hygiene researchers



was included. The revised research agenda allows for ongoing study of specific questions to support the growth of the profession. It also allows for investigation and testing of ideas that will further the transformation of dental hygiene as a profession and facilitates interprofessional collaborations.

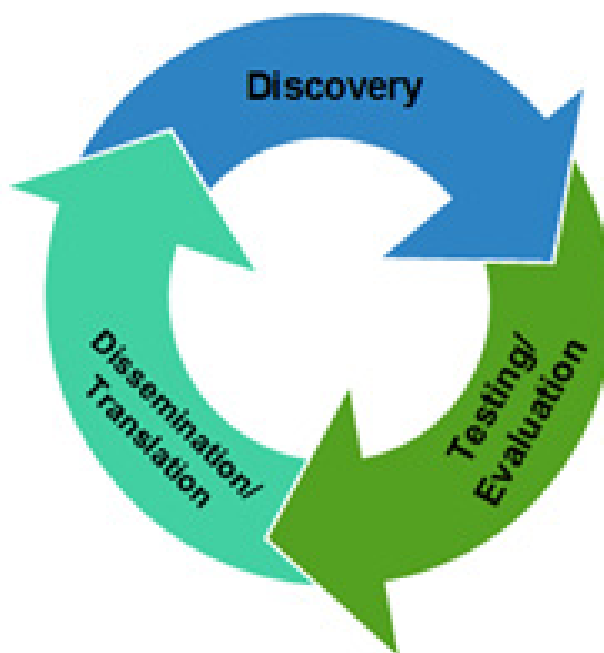
### RESEARCH AS A FOUNDATION FOR DENTAL HYGIENE EDUCATION AND PRACTICE

Research provides a foundation for continued development of dental hygiene practice guidelines and, ultimately, optimizes care for individuals, groups, communities and global populations through the use of evidence-based practices. Such a foundation supports the development of position papers that inform practice parameters and standards. Clinicians, researchers and educators can thus use the revised research agenda to generate and publish data to support the ongoing transformation of the profession in the various areas proposed, and to drive activities to build upon other areas not yet defined that might emerge as a result of transformation. Educators can use the agenda to support the ongoing growth and development of both clinicians and junior researchers to guide efforts to advance the profession while identifying new research directions that emerge.<sup>9</sup>

Research supports ongoing investigation into fundamental topics of concern to clinicians such as oral and craniofacial diseases and their mechanisms and causation, including inflammation, infection, genetics, neoplasm and the microbiome. Findings might be used to identify strategies to manage or eliminate localized or systemic disease through clinical care; improve delivery of preventive and oral health care services; and identify ways to improve access to care for individuals, groups and populations.

In the same way, research supports transformation of the process of dental hygiene education. It seeks new methods for basic and advanced education of dental hygiene professionals and investigates the outcomes of different programs. For example, research might assess differences between baccalaureate and associate level education with respect to outcomes in the areas of patient care, dental hygiene scope of practice, access to vulnerable populations and career satisfaction.

Figure 1: Phases of Research



### FRAMEWORK FOR DENTAL HYGIENE PRACTICE AND THE DISCIPLINE

As dental hygiene research advances, it is important to formulate research questions within the conceptual framework of dental hygiene theory. Some theoretical models have been developed, but many have yet to be tested. Rogers' theory of diffusion of innovations is an example of a model that might benefit dental hygienists wishing to study the translation or possibly the implementation of research into practice.<sup>10</sup> Models or theoretical frameworks of care delivery allow the profession to develop from the discipline. Before posing a research question, it is important to consider from a conceptual level the approach to be used for any given area or phase of research. Using dental hygiene theory to frame individual research questions will assist in building a strong, scientifically sound foundation.

### ADHA DENTAL HYGIENE CONCEPTUAL RESEARCH MODEL

The ADHA Dental Hygiene Conceptual Research Model illustrates the interrelationship of the areas of dental hygiene research as they progress through the phases of research and move from the level of professional development to influence client-level care and ultimately population health. As Figure 1 illustrates, the phases of research are not linear; each phase asks and answers questions that are intended

Figure 2: Conceptual Research Model

Areas of Research		Phases of Research		
		Discovery	Testing/Evaluation	Dissemination/Translation
Professional Development	Education	Evaluation	Educational models	Interprofessional education
	Regulation	Emerging work force models	Scope of practice	Interprofessional collaboration
	Occupational Health	Determination and assessment of risks	Methods to reduce occupational stressors	Career satisfaction and longevity
Client Level	Basic Science	Diagnostic testing and assessments	Dental hygiene diagnosis	Clinical decision support tools
	Oral Health Care	New therapies and prevention modalities	Health promotion: treatments, behaviors, products	Clinical guidelines
Population Level	Health Services	Epidemiology	Community interventions	Assurances and evaluation
	Access to Care	Vulnerable populations	Interventions	Outcomes assessment

to allow progression to the next phase, with the study of dissemination and translation effectiveness ultimately circling back to questions of discovery in the search for better answers and methods. It is important to note that in any of these phases of investigation, there may be a need to go back to an earlier level to re-frame or reconsider moving forward. In other words, this model is dynamic, not static.

Areas of research are equally dynamic. Professional development begins with education, which influences how the profession of dental hygiene is regulated and vice versa. Both influence client-level care and ultimately population-level health. As new methods for health services and access to care are realized, the profession must circle back to evaluate the education and regulation of dental hygiene. As illustrated in Figure 2, at the intersection of Areas of Research and each Phase of Research, topics of emphasis are illustrated.

As early as 1994, ADHA selected five paradigm concepts to study and has used these concepts to organize previous agendas. The five major concepts are: Health Promotion / Disease Prevention, Health Services Research, Professional Education and Development, Clinical Dental Hygiene Care and Occupational Health and Safety. The dental hygiene conceptual research model captures these five paradigm concepts and illustrates how they might be approached at different phases in the research process.

Researchers can enter into the process at the intersection of any area of research and any phase to ask and answer questions of importance to the discipline of dental hygiene. The model is intended to help researchers frame how their research has been influenced by a preceding phase of research and how it will lead to the next phase. Additionally, it aims to illustrate how their area of research relates to other areas where research might be conducted. The following descriptions of the topics of emphasis from the conceptual research model (Figure 2) are organized by area of research and include an explanation of how the topic fits into the phase of research where it appears.

## PROFESSIONAL DEVELOPMENT

### Education<sup>11-19</sup>

Dental hygiene is based on a specific body of knowledge transferred to new professionals through educational processes. Areas of research associated with education include evaluation of current educational processes during the discovery phase, implementing new educational models during the testing and evaluation phase, and exploration of how interprofessional education as part of the ongoing evolution of dental hygiene as a profession is associated with the translation phase of research.<sup>9</sup>

- Evaluation within the discovery phase of research for education includes ongoing as-

assessment of curricular content, delivery and adaptation of educational programming for addressing evolving models of health care and practice; assessing educational institutional investment in alternative delivery models; alternative educational programming; community return on investment; articulation; transferability and academic educational laddering for ongoing growth of the profession.

- Educational models during the testing phase of research for education requires implementation and evaluation of new or redesigned educational delivery models based on evolving global public health needs, direct and indirect assessment of both learners' and educators' performance, examining research associated with the Scholarship of Teaching and Learning (SoTL) and alternative career pathways.
- Interprofessional education considers more broadly the translation of dental hygiene education as a component of allied health education, the ability of educators to work collaboratively with other health care disciplines, recognizing diversity of faculty backgrounds for creating synergy, promoting lifelong learning and expanding access to care through all means of delivery of health care for global populations.

## Regulation

Regulation research occurs at the dental hygiene profession level. It encompasses the body of knowledge related to the practice of the profession of dental hygiene.

- Emerging workforce models involve discovery. Each state in the nation is a potential source of new models for dental hygiene care delivery. The discovery and development of regulations and rules affect the profession of dental hygiene. Regulation discovery includes new workforce models such as, but not limited to, mid-level providers, advanced dental hygiene practitioners and advanced dental hygiene therapists, as well as their effects on public health and well-being.
- Scope of practice involves testing and evaluation of potential changes to professional regulations, often through pilot programs. These regulations may have significant impact on the health of the public and ability of dental hygienists to provide the care they are educated and trained to deliver.

- Interprofessional collaborations involve professional regulations that translate knowledge into practice through collaborations with other care providers. Collaborations are an endpoint of regulation at the professional level. Areas of interprofessional collaborations include delivery of care in all practice settings, including pediatrician offices, schools and other health care settings that may include hospitals, medical offices, federally qualified health centers and holistic Complementary and Alternative Medicine settings.

## Occupational Health

Research in this area focuses predominately on practitioners and their exposure to risks in the oral health care environment. It includes prevention and behavioral issues, as well as compliance with safety measures and workforce recruitment and retention.

- Determination and assessment of risks for occupational injury is the discovery phase of research. Uncovering potential hazards to occupational health in the workplace may involve investigating ergonomic impacts, as well as those of aerosols, chemicals, latex, nitrous oxide, noise and infectious diseases.
- Methods to reduce occupational stressors involve testing and evaluation of techniques to reduce or eliminate hazards to occupational health. This includes assessing prevention methods, behaviors, compliance with safety measures and error reduction.
- Career satisfaction and longevity research assesses the dissemination and translation into practice of methods that reduce the harmful effects of occupational stressors on practitioners. Additionally, it seeks to determine if the successful translation of these methods into practice and the reduction of occupational stressors results in improved careers for dental hygienists.

## CLIENT LEVEL

### Basic Science

Basic science research is important at the client level for understanding the mechanisms of health and disease, and investigating the links between oral and systemic health. Areas of research range from caries and periodontal disease to immunology, genetics, cancer, nutrition, pharmacology and exposure to environmental stressors.

- Diagnostic testing and assessments in basic science research is discovery of new tools for diagnosis of conditions and diseases and new methods of risk assessment prior to development of disease.
- Dental hygiene diagnosis is the testing phase where research is used to evaluate the use of knowledge of emerging science to determine client conditions or needs as related to dental hygiene care.
- Clinical decision support tools are the outcome of research validating dental hygiene diagnosis and the translation of those outcomes into tools that can be used broadly in clinical practice. Research in this area confirms the usefulness of the tools developed for this purpose.

### Oral Health Care

Research regarding the dental hygienist's role in oral health care encompasses all aspects of the process of care at the client level, including assessment, diagnosis, treatment planning, implementation, evaluation and documentation.

- New therapies and prevention modalities for oral health care are developed or improved in the discovery phase of research. This may include new procedures, treatments, behavioral interventions, and instruments/tools/products for delivering client care, new oral self-care products or improved ergonomics.
- Health promotion: treatments, behaviors, products in the testing phase means evaluating clinical care products, services, behavioral interventions, and new and alternative treatments developed for these purposes at the client level, often through clinical trials, for safety and effectiveness.
- Clinical guidelines are developed as a result of successful treatment and prevention methods and are derived from a strong body of evidence that reflects improved client outcomes. These in turn need translation into routine clinical practice and need to be evaluated through research to assess both their adoption and effectiveness.

## POPULATION LEVEL

### Health Services

Health services research is included as part of the population-level area of research. Past agendas identified many objectives in this area. The revised agenda reorganizes health services

and access to care to better show the relationship among the phases of research.

- Epidemiology in health services research involves discovery. Epidemiological research includes surveys of oral health status and related needs of specific populations and other important health services data related to oral health and dental hygiene.
- Community interventions are critical to understanding the testing and impact of oral care interventions on population health. Community interventions have the potential to improve oral health by treating groups rather than individuals. Such programs include school-based oral care programs and public health nutritional campaigns to eliminate or reduce caries, periodontal disease and other preventable oral health problems.
- Assurances and evaluation combine as an ongoing strategy to improve translation of population health and community interventions. All programs benefit from the knowledge derived from evaluation of program effectiveness and quality and from assuring that best practices represent outcomes data.

### Access to Care

Access to care research involves identifying populations that are challenged to achieve positive health outcomes including good oral health due to recognized and unrecognized barriers to care. Systems of health delivery can be developed, adapted, improved and evaluated for effectiveness in improving access to care and health outcomes in identified populations.

- Vulnerable populations are identified in the discovery phase of research through population-level data that link poor health outcomes to various group characteristics. This phase of research also seeks to discover possible barriers to care.
- Interventions are developed and implemented in the testing phase of research on access to care. Supporting research might evaluate methods designed to overcome barriers to access or use of risk-reduction strategies in special at-risk populations such as people with diabetes, tobacco users, pregnant women or those identified as genetically susceptible to disease.
- Outcomes assessment is a critical aspect of translation of research into population-level health. This phase of research involves



verification of improved population health outcomes when presumed barriers or risk-reduction strategies have been addressed across a broad group or identified population.

## ADHA'S STRATEGIC PLAN DRIVES RESEARCH PRIORITIES

Based on the ADHA's Conceptual Research Model and Strategic Plan, priority areas that researchers are encouraged to investigate include:

1. Differences between baccalaureate- and associate-level educated dental hygienists.
2. The impact of dental hygiene mid-level practitioners on oral health outcomes.
3. Development and testing of conceptual mod-

els distinct to dental hygiene that will guide education, practice and research.

4. Efficacy of preventive interventions across the lifespan including oral health behaviors.
5. Patient outcomes in varying delivery systems (this can include cost effectiveness, workforce models, telehealth, access to care, direct access etc.).

Focus on these priorities has the potential to accelerate the pace of transformation of the profession to improve the public's oral and overall health. Within these priority areas are research questions to be asked and answered that will impact the future of the profession and the direction of ADHA. Investigators are strongly encouraged to consider how their research might contribute to these priority areas.

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## ADDITIONAL RESOURCES

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- ADHA's Research Center  
<http://www.adha.org/research-center>
- Institute for Oral Health, Research Grants  
<http://www.adha.org/ioh-research-grants-main>
- National Center for Dental Hygiene Research & Practice  
<https://dent-web10.usc.edu/dhnet/>
- National Center for Dental Hygiene Research & Practice, Dental Hygiene Research Toolkit  
[https://dent-web10.usc.edu/dhnet/research\\_kit.pdf](https://dent-web10.usc.edu/dhnet/research_kit.pdf)
- The National Dental Practice-Based Research Network  
<http://www.nationaldentalpbrn.org/>
- American Association for Dental Research (AADR), Student Research Fellowships  
[http://www.aadronline.org/i4a/pages/index.cfm?pageid=3569#.VT\\_Er7I0xtQ](http://www.aadronline.org/i4a/pages/index.cfm?pageid=3569#.VT_Er7I0xtQ)
- Centers for Disease Control and Prevention (CDC), Division of Oral Health  
<http://www.cdc.gov/oralhealth/>
- Centre for Evidence Based Dentistry  
<http://www.cebd.org/>





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\*Based on a survey of dentists' survey of patients' oral health issues, including plaque, tartar, tooth decay, and more (8-09).

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